

US 41
MEMORIAL DRIVE TO COUNTY M
BROWN COUNTY, WISCONSIN
PROJECT I.D. 1133-10-01

**FINAL ENVIRONMENTAL IMPACT STATEMENT
AND SECTION 4(F) EVALUATION**

Submitted Pursuant to 42 USC 4332(2)(c) and 49 USC 303
by the

U.S. Department of Transportation, Federal Highway Administration (FHWA)
and

State of Wisconsin Department of Transportation (WisDOT)

Cooperating Agencies

U.S. Army Corps of Engineers and
Wisconsin Department of Natural Resources (pursuant to 23 USC 139)

APPROVALS

7-7-11
Date

For Federal Highway Administration

6/28/11
Date

For Wisconsin Department of Transportation

CONTACTS FOR ADDITIONAL INFORMATION ABOUT THIS DOCUMENT

George Poirier
Federal Highway Administration
525 Junction Road, Suite 8000
Madison, WI 53717
Phone: (608) 829-7500

Rebecca Burkel
WisDOT Bureau of Technical Services
P.O. Box 7965
Madison, WI 53707-7965
Phone: (608) 246-5399

ABSTRACT

The proposed US 41 improvements evaluated in this EIS extend from Memorial Drive to County M in Brown County, Wisconsin, a distance of approximately 3.3 miles. Proposed improvements include reconstructing the Velp Avenue, I-43, and County M interchanges and providing additional capacity on US 41. US 41 is a major freeway connecting the Milwaukee and Chicago metropolitan areas with the Fox River Valley industrial area and recreational resources in northeastern Wisconsin and upper Michigan. It is also a National Highway System (NHS) route and is planned for future designation as an Interstate Highway. The existing US 41 freeway has insufficient capacity to meet existing and future mobility needs. The existing interchanges at Velp Avenue, I-43 and County M have insufficient capacity, operational deficiencies and safety concerns. As traffic increases, capacity and operational deficiencies will contribute to additional mobility and safety concerns. The preferred alternative presented in this Final EIS provides the best long-term solution for meeting future mobility needs, improving safety, and minimizing impacts to the natural and built environment to the extent practicable.

Comments on this Final EIS are due by August 22, 2011, or 30 days after the Notice of Availability is published in the Federal Register, whichever is later, and should be sent to:

Danielle Block, PE, Project Manager
Wisconsin Department of Transportation
US 41 Brown County Project Office
1940 West Mason Street
Green Bay, WI 54303
Danielle.Block@dot.wi.gov

National Environmental Policy Act Statement

The National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S.C. 4332) requires that all federal agencies prepare a detailed Environmental Impact Statement (EIS) for major federal actions that will significantly affect the quality of the human environment. The Federal Highway Administration (FHWA) is therefore required to prepare an EIS for proposals funded under its authority if such proposals are determined to be major actions significantly affecting the quality of the human environment.

The EIS process is carried out in two stages. The **Draft EIS** is circulated for review by federal, state, and local agencies with jurisdiction by law or special expertise, and made available to the public. The Draft EIS must be made available to the public at least 15 days before the public hearing, and no later than the first public hearing notice. A minimum 45-day comment period is provided from the date the Draft EIS availability notice is published in the *Federal Register*. WisDOT must receive public and agency comments on or before the date listed on the front cover of the Draft EIS unless a time extension is requested and granted by WisDOT. After the Draft EIS comment period has elapsed, work may begin on the Final EIS.

The **Final EIS** includes the following:

1. Identification of the preferred course of action (alternative) and the basis for its selection.
2. Basic content of the Draft EIS along with any changes, updated information, or additional information as a result of agency and public review.
3. Summary and disposition of substantive comments on social, economic, environmental and engineering aspects resulting from the public hearing/public comment period and agency comments on the Draft EIS.
4. Resolution of environmental issues and documentation of compliance with applicable environmental laws and related requirements.

Final administrative action by FHWA (Record of Decision) cannot occur sooner than 90 days after filing the Draft EIS, or 30 days after filing the Final EIS with the U.S. Environmental Protection Agency. Both the Draft and Final EIS are full-disclosure documents that provide descriptions of the proposed action, the affected environment, alternatives considered and an analysis of beneficial or adverse environmental effects.

A federal agency may publish a notice in the *Federal Register*, pursuant to 23 USC §139(l), indicating that one or more federal agencies have taken final action on permits, licenses, or approvals for a transportation project. If such notice is published, claims seeking judicial review of those federal agency actions will be barred unless such claims are filed within 180 days after the date of publication of the notice, or within such shorter time period as is specified in the federal laws pursuant to which judicial review of the federal agency action is allowed. If no notice is published, then the periods of time that otherwise are provided by the federal laws governing such claims will apply.

Study Area Location Map

US 41
(Memorial Drive to County M)
Brown County
Project I.D. 1133-10-01



Final EIS Overview

The Final EIS responds to comments received on the Draft EIS, summarizes input from the March 2, 2011 public hearing, and identifies the preferred alternative and basis for its selection. Key changes between the Draft and Final EIS are summarized below. New or revised text in the Final EIS is shaded or indicated with a vertical line in the right margin.

Location Map

Location map inside front cover has been updated.

Contents

Table of contents updated to reflect revised or new headings.

Summary

- Text added to page S-5 concerning selection of Preferred Alternative E
- New Exhibit S-3 provides updated impact information for Alternatives D and E

Section 1—Purpose and Need for Proposed Action

No changes.

Section 2—Alternatives

- 2.2.2, 2.2.3 and 2.2.5—The term *basic segment* changed to *roadway* or *mainline* for clarification.
- 2.2.6—Information added to 5-leg roundabout discussion to indicate this option has been dropped from further consideration.
- 2.4—Section has been renamed “Preferred Alternative”; Discusses Preferred Alternative E with refinements made since the Draft EIS, and basis for its selection.
- New Exhibit 2-2A for revised Beaver Dam Creek realignment.
- New Exhibit 2-7 for Preferred Alternative E as revised since Draft EIS.

Section 3—Existing Conditions, Environmental Impacts and Measures to Mitigate Adverse Impacts

- 3.2.3—Information provided on goals and objectives in local comprehensive plans for preserving natural resources.
- 3.5.1 and 3.6.1—Updated information on residential and business displacements since Draft EIS.
- 3.7.1—Updated information on wetland impacts since Draft EIS. Table 3-12 updated to provide more information on affected wetlands. New wetland maps (Exhibits 3-3 through 3-5) provided to better illustrate the affected wetlands and their relationship to other resources.
- 3.7.2—Additional information has been added to “Compensation for Unavoidable Wetland Impacts” concerning goals of the Resort Road wetland mitigation site and functional values of impacted wetlands versus replacement wetlands at the Resort Road wetland mitigation site.
- New EIS section 3.7.3 (Wetlands—Only Practicable Alternative Finding) has been added.
- 3.8.3—Additional information has been added on measures to minimize adverse effects of Beaver Dam Creek realignment, and on maintenance access roads with respect to not restricting wildlife movement or hydraulic connections between adjacent wetlands.
- 3.18.7—Additional information has been added on potential wetland impacts due to utility adjustments.
- 3.18.10—New section on construction and maintenance access roads including potential additional permanent wetland impacts.

Section 4—Section 4(f) and 6(f) Evaluation

- Title has been changed to Final Section 4(f) and 6(f) Evaluation.
- 4.7 New section providing information on updated public use land impacts for Preferred Alternative E.
- 4.8 New section providing updated information on mitigation measures for Preferred Alternative E.
- 4.9 New section concluding that there is no feasible and prudent alternative to use of land from Section 4(f) and Section 6(f) resources.

Section 5—Public Involvement and Agency Coordination

- New section 5.3.3 (Agency Coordination During Final EIS Activities) added.
- New section 5.4 (Public Hearing) added.
- Appendix C—Agency comments on Draft EIS and Preferred Alternative added, along with comment responses as applicable.

Contents

Summary	S-1
1. Purpose and Need for Proposed Action	1-1
1.1 Proposed Action.....	1-1
1.2 Purpose of Proposed Action.....	1-1
1.3 Need for Proposed Action	1-2
1.3.1 System Linkage and Route Importance.....	1-2
1.3.2 Traffic Demand/Operations.....	1-2
1.3.3 Existing Highway Deficiencies	1-7
1.3.4 Safety	1-9
2. Alternatives.....	2-1
2.1 Description of Initial Range of Alternatives	2-1
2.1.1 Alternative A: No Build.....	2-1
2.1.2 Build Alternatives.....	2-1
2.1.2 (a) Roundabout Options in Northwest quadrant of US 141/Velp Avenue interchange	2-2
2.1.2 (b) Realignment of Beaver Dam Creek.....	2-2
2.1.3 Alternative B: US 41 expansion with minor ramp improvements to I-43/US 41 interchange.....	2-3
2.1.4 Alternative C: US 41 expansion with C/D roadways between US 141/Velp Avenue and I-43	2-3
2.1.5 Alternative D: US 41 expansion with C/D roadways between US 141/Velp Ave and I-43 with Freeway Split Configuration	2-3
2.1.6 Alternative E: US 41 expansion with full reconfiguration of I-43/US 41 Interchange	2-4
2.2 Alternatives Evaluation and Screening.....	2-4
2.2.1 Alternative A: No Build.....	2-5
2.2.2 Alternative B: US 41 expansion with minor ramp improvements to I-43/US 41 interchange (Eliminated from further consideration)	2-6
2.2.3 Alternative C: US 41 expansion with C/D roadways between US 141/Velp Avenue and I-43	2-7
2.2.4 Alternative D: US 41 expansion with C/D roadways between US 141/Velp Ave and I-43 with Freeway Split Configuration	2-8
2.2.5 Alternative E: US 41 expansion with full reconfiguration of I-43/US 41 Interchange	2-9
2.2.6 Comparison of Roundabout Options in Northwest Quadrant of US 141/Velp Avenue Interchange	2-10
2.3 Other Alternatives Considered	2-13
2.3.1 Improvements without Additional Capacity on US 41	2-13
2.3.2 US 41 Expansion with the US 141/Velp Avenue Interchange Removed	2-13
2.3.3 Transportation System Management.....	2-14
2.3.4 Transportation Demand Management	2-14
2.3.5 Other Transportation Modes.....	2-15

2.4	Selection of Preferred Alternative.....	2-16
2.4.1	Summary of Preferred Alternative E	2-16
2.4.2	Alternative E Updates and Refinements	2-16
2.4.3	Basis for Selection of Preferred Alternative E.....	2-18
2.4.3 (a)	Purpose and Need Factors	2-18
2.4.3 (b)	Environmental Impacts and Mitigation Measures.....	2-20
2.4.3 (c)	Agency and Public Input.....	2-20
2.4.4	Conclusion.....	2-21
3.	Existing Conditions, Environmental Impacts and Measures to Mitigate Adverse Impacts .	3-1
3.1	Transportation and Land Use Planning.....	3-1
3.2	Indirect and Cumulative Effects	3-3
3.2.1	Indirect Effects.....	3-4
3.2.2	Cumulative Effects.....	3-6
3.2.3	Measures to Minimize Potential Adverse Effects.....	3-9
3.3	Socioeconomic Factors.....	3-10
3.4	Environmental Justice.....	3-14
3.5	Residential Development.....	3-15
3.5.1	Residential Displacements.....	3-16
3.5.2	Measures to Mitigate Adverse Effects.....	3-18
3.6	Commercial and Industrial Development.....	3-18
3.6.1	Business Displacements.....	3-18
3.6.2	Measures to Mitigate Adverse Effects.....	3-19
3.7	Wetlands.....	3-19
3.7.1	Wetland Impacts.....	3-20
3.7.2	Measures to Minimize Adverse Effects.....	3-29
3.7.3	Wetlands – Only Practicable Alternative Finding	3-33
3.8	Streams and Floodplains.....	3-36
3.8.1	Streams/Water Quality Impacts	3-38
3.8.2	Floodplain Impacts	3-39
3.8.3	Measures to Minimize Adverse Effects.....	3-41
3.9	Groundwater and Drinking Water Supply.....	3-42
3.9.1	Groundwater and Drinking Water Supply Impacts.....	3-43
3.10	Threatened and Endangered Species.....	3-44
3.10.1	Threatened or Endangered Species Impacts.....	3-45
3.10.2	Measures to Minimize Adverse Effects.....	3-45
3.11	Recreational / Resources / Public Use Lands.....	3-46
3.12	Soils.....	3-49
3.13	Air Quality.....	3-50
3.13.1	Air Quality Impacts.....	3-50
3.14	Noise.....	3-51
3.14.1	Noise Impacts.....	3-51
3.14.2	Measures to Mitigate Noise Impacts.....	3-53
3.15	Cultural Resources.....	3-54
3.16	Hazardous Materials.....	3-55
3.16.1	Hazardous Materials Impacts.....	3-55
3.16.2	Measures to Mitigate Adverse Effects.....	3-56

3.17	Aesthetics.....	3-56
3.18	Construction.....	3-58
3.18.1	Construction Costs.....	3-58
3.18.2	Construction Noise.....	3-58
3.18.3	Air Quality (Emissions and Dust).....	3-59
3.18.4	Vibration.....	3-60
3.18.5	Water Quality.....	3-60
3.18.6	Material Source Sites.....	3-60
3.18.7	Utility Adjustments.....	3-61
3.18.8	Invasive Species.....	3-62
3.18.9	Transportation Management Plans for Work Zones.....	3-63
3.18.10	Construction and Maintenance Access Roads.....	3-64
3.19	Relationship of Local and Short-Term Uses Versus Long-Term Productivity.....	3-64
3.20	Irreversible and Irretrievable Commitments of Resources.....	3-65
4.	Section 4(f) and Section 6(f) Evaluation.....	4-1
4.1	Introduction.....	4-1
4.2	Public Use Land and Applicability of Section 4(f) and Section 6(f) Requirements.....	4-1
4.3	Proposed Action/Impacts to Publicly Owned Resources.....	4-8
4.4	Avoidance / Other Alternatives.....	4-10
4.5	Measures to Minimize Adverse Impacts.....	4-10
4.6	Coordination.....	4-11
4.7	Updated Public Use Land Impacts for Preferred Alternative E.....	4-12
4.8	Updated Mitigation Measures for Preferred Alternative E.....	4-13
4.9	Conclusion.....	4-13
5.	Public Involvement and Agency Coordination.....	5-1
5.1	Public Involvement.....	5-1
5.1.1	Public Information Meetings.....	5-1
5.1.2	Public Information Web Site.....	5-2
5.1.3	Other Public Outreach Activities.....	5-3
5.2	Coordination with Local Officials.....	5-4
5.3	Resource Agency and Native American Tribe Coordination.....	5-4
5.3.1	Agency Coordination Prior to Current EIS.....	5-5
5.3.2	Agency Coordination During Current EIS Activities.....	5-7
5.3.3	Agency Coordination During Final EIS Activities.....	5-9
5.4	Public Hearing.....	5-10
5.4.1	Hearing Notices.....	5-10
5.4.2	Hearing Displays and Other Materials.....	5-11
5.4.3	Hearing Format and Testimony Options.....	5-12
5.4.4	Public Hearing Input.....	5-12

Appendices

- A Conceptual Stage Relocation Plan
- B MSAT Qualitative Analysis
- C Agency Correspondence

EIS Distribution List
List of Preparers

Tables

1-1	Existing and Forecast Traffic (2005-2035).....	1-3
1-2	Level of Service (LOS) Values and Descriptions	1-5
1-3	Acceptable Levels of Services.....	1-5
1-4	Design Year 2035 LOS for Freeway Sections	1-6
1-5	Design Year 2035 Unsignalized Intersections Operating at LOS F	1-6
1-6	Grade Separation Structures	1-7
1-7	Locations with Inadequate Separation Between Interchange Ramps and Side Roads	1-8
1-8	Existing Horizontal Design Speeds for the Tight Loop Ramps at US 41/I-43 Interchange.....	1-8
1-9	US 41 and I-43 Mainline Crash Data (2005-2007).....	1-10
1-10	US 41/I-43 Ramp Crash Data (2005-2007)	1-10
3-1	Summary of Transportation, Land Use and Related Documents.....	3-1
3-2	Summary of Indirect Effects.....	3-5
3-3	Summary of Cumulative Effects	3-8
3-4	Population Trends (2000)	3-11
3-5	Population Forecasts (2009).....	3-11
3-6	Housing Characteristics (2000)	3-11
3-7	Income and Employment Trends (2000).....	3-12
3-8	Racial Composition (2000)	3-12
3-9	Commuting Patterns – Worker Destinations (2000).....	3-12
3-10	Mean Travel Time to Work (2000)	3-13
3-11	Wetland Types in Project Area	3-20
3-11a	Difference in Wetland Impacts between Draft and Final EIS	3-21
3-12	Wetland Impacts for Build Alternatives	3-22
3-13	Public Use Land Summary	3-46
3-14	Air Quality Analysis Summary	3-50
3-15	Typical Sound Levels	3-51
3-16	Noise Abatement Criteria.....	3-52
3-17	Noise Impact Summary (Build Alternatives D and E).....	3-52
3-18	Construction Noise/Distance Relationships	3-58
5-1	Summary of Public Hearing Input	5-14

Figures

1-1	Existing AADT (Year 2005).....	1-3
1-2	Future AADT (Year 2015).....	1-4
1-3	Future AADT (Year 2035).....	1-4

2-1	Alternatives Comparison to Key Purpose and Need Factors	2-12
2-2	US 41/Velp Ave Interchange Removed	2-13
3-1	Indirect and Cumulative Effects Analysis Area	3-4
3-2	US 41 Project Corridor Census Block Groups	3-15
3-3	Residential and Business Displacements	3-17
3-4	Resort Road Wetland Mitigation Site Location	3-32
3-4A	Proposed Freedom Wetland Mitigation Site Location	3-33
3-5	Fill Encroachment into 100-year Floodplain Alternative D	3-37
3-6	Fill Encroachment into 100-year Floodplain Alternative E	3-38
3-7	Water Supply Well Locations	3-43
3-8	Public Use Lands in Project Area	3-48
4-1	Lehner Park	4-2
4-2	Ken Euers Nature Area	4-3
4-3	Gordon Nauman Conservation Area	4-4
4-4	Wietor Wharf Park	4-5
4-5	Deerfield Docks Park	4-6

Exhibits

2-1	Options for Access to NW Quadrant of US 41/Velp Avenue Interchange	2-22
2-2	Beaver Dam Creek Realignment	2-23
2-2a	Revised Beaver Dam Creek Realignment	2-24
2-3	Alternative B: US 41 expansion with minor ramp improvements to I-43/US 41 interchange..	2-25
2-4	Alternative C: US 41 Expansion with C/D roadways between US 141/Velp Avenue and I-43	2-26
2-5	Alternative D: US 41 Expansion with C/D roadways between US 141/Velp Ave and I-43 with Freeway Split Configuration	2-27
2-6	Alternative E: US 41 Expansion with Full Reconfiguration of I-43/US 41 interchange	2-28
2-7	Preferred Alternative E: US 41 Expansion with Full Reconfiguration of I-43/US 41 interchange	2-29
3-1	Existing Land Use	3-67
3-2	Future Land Use	3-68
3-3	Affected Wetlands Alt D, Memorial Drive to Lakeview Drive	3-69
3-4	Affected Wetlands Preferred Alt E, Memorial Drive to Lakeview Drive	3-70
3-5	Affected Wetlands Common to Alt D and E, Lakeview Drive to Woodfield Court	3-71
3-6	Air Quality Receptor Locations	3-72
3-7	Letter from WDNR's Air Management Bureau	3-73
3-8	Noise Receptor Locations	3-74
3-9	Conceptual Utility Adjustments for Preferred Alternative E	3-79
3-10	Additional Wetland Impact for Bridge Maintenance Access Roads for Alternative D	3-80
3-11	Additional Wetland Impact for Bridge Maintenance Access Roads for Alternative E	3-81
4-1	Concept for Bike/Ped access across Duck Creek, Alternative D	4-14
4-2	Concept for Bike/Ped access across Duck Creek, Alternative E	4-15
4-2a	Concept for Bike/Ped access across Duck Creek, Preferred Alternative E	4-16
4-3	Peters Acquisition Section 6(f) Replacement	4-17
4-4	Letter from Village of Howard and WisDOT's response to Section 4(f) mitigation options	4-18
4-5	Letter from Village of Howard for concurrence of Section 4(f) mitigation	4-22

AADT	annual average daily traffic
AASHTO	American Association of State Highway and Transportation Officials
ACM	asbestos containing materials
APE	area of potential effects
ATC	American Transmission Company
BMP	best management practice
CCRG	Community Cultural Resources Group
C/D	collector/distributor
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CMAQ	Congestion Mitigation and Air Quality
CP	coordination plan
CSD	community-sensitive design
County	county trunk highway
dB	decibel
dBA	decibel A-weighted
DNR	Wisconsin Department of Natural Resources
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
FDM	Facilities Development Manual
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	flood insurance rate map
FWS	U.S. Fish and Wildlife Service
GBMSD	Green Bay Metropolitan Sewerage District
GDHS	Geometric Design of Highways and Streets
GIS	geographic information system
HMVMT	hundred million vehicle miles traveled
HOT	high occupancy toll
HOV	high occupancy vehicle
IAJR	interstate access justification report
IAM	impact analysis methodology
ICE	indirect and cumulative effects
I-43	Interstate Highway 43

ITS	intelligent transportation system
LOS	level of service
LWCF	Land and Water Conservation Fund
mph	miles per hour
MPO	Metropolitan Planning Organization
MSAT	mobile source air toxics
NAAQS	National Ambient Air Quality Standards
NAC	noise abatement criteria
NEPA	National Environmental Policy Act
NHI	Natural Heritage Inventory
NHS	National Highway System
NPS	National Park Service
NRHP	National Register of Historic Places
PDI	pavement distress index
PIM	public informational meeting
PM	particulate matter
ppm	parts per million
ORAP	Outdoor Recreation Act Program
ROD	Record of Decision
SAFETEA-LU	Safe, Accountable, and Flexible Efficient Transportation Equity Act—A Legacy for Users
SHPO	State Historic Preservation Office
TDM	transportation demand model
TMP	transportation management plans
TNM	Traffic Noise Model®
TSM	Transportation System Management
TSS	total suspended solids
TTC	temporary traffic control
USACE	U.S. Army Corps of Engineers
US 41	United States Highway 41
WisDOT	Wisconsin Department of Transportation

Summary

Proposed Action

The proposed action is to reconstruct US 41 from Memorial Drive to County M/Lineville Road in Brown County, Wisconsin (See location map inside front cover). Proposed improvements include providing additional traffic capacity on US 41 and reconstructing the interchanges at Velp Avenue, I-43, and County M to meet current design standards and to improve traffic flow and safety. See EIS Section 1 for more information on the proposed improvements.

History/Relationship to Other Proposed Actions

Improvements in the US 41 corridor in Brown County were initially evaluated in the *US 41 Orange Lane to County M Expansion Study* (WisDOT Project I.D. 1133-03-01) that covered the approximate 14 mile portion of US 41 from Orange Lane near the County F interchange to the County M interchange (see Exhibit S-1, Page S-7). The scope of improvements under the original study included upgrading the existing interchanges and providing additional capacity on US 41. An Environmental Assessment for the original study was approved by the Federal Highway Administration (FHWA) on June 4, 2002 and a Finding of No Significant Impact was approved on April 4, 2003. It should be noted that the original corridor study did not include improvements at the County M interchange, and only minor improvements were proposed at the I-43 interchange. The project is currently being designed in manageable sections and will be constructed in stages based on funding allocation and other factors. The US 41 project design sections are illustrated in Exhibit S-1.

Based on additional engineering and environmental evaluation in the preliminary design phase, WisDOT in cooperation with FHWA, has refined the previous improvement concepts to varying degrees throughout the corridor. In general, design refinements have been made to provide interchange configurations that best address local and regional mobility needs, particularly at the major systems interchanges (freeway to freeway interchanges) like the US 41/I-43 interchange, and to improve traffic flow and safety on US 41. The design refinements also include using roundabouts rather than signalized intersections at interchange ramp terminals and local road intersections.

Updated environmental documentation has been prepared to account for changes in impacts due to the design refinements and more detailed information on affected environmental resources including wetlands. The level of updated environmental documentation was determined by WisDOT and FHWA based on the extent of the design refinements and magnitude of environmental impacts in a particular US 41 project section. The status of updated environmental documentation for the US 41 project sections is indicated in Exhibit S-1. WisDOT and FHWA in consultation with state and federal review agencies determined that an EIS would be prepared for the Memorial Drive to County M project section primarily due to the magnitude of wetland impacts.

Each project section within the entire US 41 corridor consists of stand-alone improvements that do not require or foreclose improvements in the remainder of the US 41 corridor. Reconstructing a particular interchange and/or making capacity improvements on a particular portion of US 41 would have independent utility whether or not additional improvements are made.

Purpose and Need for Proposed Action

The purpose of the proposed action is to make transportation improvements in the US 41 Memorial Drive to County M corridor that accomplish the following objectives:

- Meet traffic demand and mobility needs including future conversion of US 41 to an Interstate Highway
- Improve traffic flow and safety on US 41 and its interchanges
- Address geometric and operational deficiencies
- Provide reasonable and safe local access while at the same time preserving freeway operations and safety
- Minimize impacts to the natural and built environment to the maximum extent practicable

The need for proposed improvements is based on a combination of the following factors (see Section 1 for more detailed information):

System Linkage and Route Importance

US 41 and I-43 provide a vital north-south transportation link between the Chicago-Milwaukee metropolitan area, the Fox River Valley industrial area, and recreational areas in northeastern Wisconsin and upper Michigan. US 41 is a multi-lane backbone highway under WisDOT's Connections 2030 Plan for providing a network of high quality highways linking the state's economic centers and designated with maximum service and safety characteristics. US 41 is a National Highway System (NHS) route serving major population centers, multimodal transportation facilities and meeting national defense requirements. US 41 is also being planned for future conversion to an Interstate Highway between Milwaukee and I-43 in Green Bay.

Traffic Demand/Operations

Existing (2005) Annual Average Daily Traffic (AADT) in the US 41 project corridor ranges from 50,200 AADT to 61,200 AADT. In design year 2035, traffic is expected to reach 80,500 AADT to 97,700 AADT, an increase of 60% to 66%. Existing traffic volumes between Memorial Drive and Velp Avenue already exceed the threshold at which capacity improvements should be considered and the remainder of the corridor will exceed this threshold in the design year. Existing traffic on I-43 between US 41 and Atkinson Drive is 38,400 AADT and is expected to reach 55,700 AADT in 2035, an increase of 45%.

The traffic operations analysis indicates that most of the existing US 41 freeway will operate at an unacceptable Level of Service (LOS) in design year 2035 (LOS D, E, or F compared to LOS C which is the acceptable LOS for *Connections 2030* backbone highways). In addition, all existing signalized intersections except the Velp Avenue/Atkinson Drive intersection will operate at LOS F in the PM peak hour.

Highway Deficiencies

The existing US 41 freeway and its interchanges were constructed over 35 years ago to handle substantially lower traffic volumes than it does today. The existing US 41 typical section (number of driving lanes, shoulder widths) is not sufficient to accommodate projected traffic in design year 2035, and does not meet current design standards. Close proximity of the Velp Avenue and I-43 interchanges causes operational deficiencies and safety concerns due to inadequate traffic weaving distances. The length of the exit ramps at the Velp Avenue interchange is substandard. The tight loop ramps at the I-43 interchange have design speeds that are less than desirable for System interchanges (freeway to freeway interchanges) and the speed differential between the freeway mainline and the loop ramps increases the potential for vehicles to run off the road if speed isn't sufficiently reduced to negotiate the controlling loop ramp radius.

Safety

The US 41 mainline from Memorial Drive to I-43 has an average annual crash rate above the statewide average rate for similar highways. The average injury and fatal crash rate in the section between Velp Avenue and I-43 is also above the statewide average. All ramps at the I-43 interchange have average annual crash rates and average injury and fatal crash rates above the statewide average.

Alternatives

Alternative A: No Build

Under the No Build Alternative, US 41 would not be expanded to provide additional roadway capacity. Any future work along US 41, including the interchanges, would attempt to maintain current capacity levels, preserve an acceptable roadway surface, and address safety concerns at critical locations. The No Build would fail to address future traffic demands, highway deficiencies, and safety concerns along US 41. The No Build Alternative will serve as a comparison to the Build Alternatives discussed in the study.

Build Alternatives

Four build alternatives were developed and evaluated during preparation of the EIS. Build Alternatives B, C, D and E include a range of options for improving traffic capacity, traffic operations and safety on the US 41 freeway mainline and its interchanges. The main difference among the Build Alternatives occurs along the US 41 mainline between Velp Avenue and I-43 where various improvement levels are being considered, and at the US 41/I-43 System Interchange, where various interchange configurations are being considered.

Improvements that are common to all of the Build Alternatives include the following.

- Widen the US 41 freeway mainline, from Memorial Drive to County M, from 4 to 6 lanes and add auxiliary lanes along northbound and southbound US 41.
- Reconstruct the Velp Avenue interchange including roundabouts at the ramp terminals and at the Velp Avenue and Memorial Drive intersection.
- Reconstruct the County M interchange including roundabouts at the ramp terminals and at the County M/frontage road intersections.
- Construct new bridges over Velp Avenue, Canadian National (CN) Railroad, Wietor Drive, I-43, and Duck Creek.
- Replace the County EB/Lakeview Drive and County M bridges over US 41.
- Realign Beaver Dam Creek and replace the box culvert south of Velp Avenue interchange
- Build storm water detention ponds at the Velp Avenue interchange and at County EB/Lakeview Drive.
- Maintain the existing separation distance between the US 41 mainline and the frontage roads from I-43 to County M.

Alternative B: US 41 expansion with minor improvements to I-43/US 41 interchange

In addition to the common improvements for all build alternatives, Alternative B has the following key design features:

- Expand US 41 along its existing alignment from Velp Avenue to I-43.
- Extend the on and off ramps at the Velp Avenue interchange and realign them slightly to meet current design standards and accommodate roundabouts at the interchange ramp terminals.
- Construct an outside auxiliary lane along northbound and southbound US 41 between the Velp Avenue and I-43 interchanges to improve traffic weaving conditions.
- Make minor improvements to existing ramp geometry at the I-43/US 41 System Interchange to accommodate the wider US 41 mainline.
- Maintain access from Velp Avenue to I-43 via US 41 as it is today.

Alternative B was eliminated from further consideration as a reasonable build alternative because it would not address operational and safety issues resulting from the short weaving section along the US 41 mainline. Further, Alternative B would not be compatible with future conversion of US 41 to an Interstate Highway. See Section 2 for more information.

Alternative C: US 41 expansion with C/D roadways between US 141/Velp Ave and I-43

In addition to the common improvements for all build alternatives, Alternative C has the following key design features:

- Expand US 41 along its existing alignment from Velp Avenue to I-43.
- Construct Collector-Distributor (C/D) roads on both sides of US 41 between Velp Avenue and I-43. The C/D roads would accommodate traffic weaving movements rather than having those movements occur on the US 41 freeway mainline.
- Extend the on and off ramps at the Velp Avenue interchange and realign them slightly to meet current design standards and accommodate roundabouts at the interchange ramp terminals.
- Make minor improvements to existing indirect loop ramp geometry at the I-43/US 41 System Interchange to accommodate the wider US 41 mainline. Additional lighting along with enhanced signing and marking will be added to mitigate the tight loop ramps.
- Improve the semi-directional ramp from southbound US 41 to southbound I-43 to a 60 mph design speed, and the directional ramp from northbound I-43 to northbound US 41, to a 70 mph design speed.
- Maintain access from Velp Avenue to I-43 via US 41 as it is today.

Alternative C was eliminated from further consideration as a reasonable build alternative because it would not provide any substantive traffic operations, safety or access benefits compared to Alternative D, and because it would have greater impacts to public use lands and higher quality wetlands. See Section 2 for more information.

Alternative D: US 41 expansion with C/D roadways between US 141/Velp Ave and I-43 with freeway split configuration

In addition to the common improvements for all build alternatives, Alternative D has the following key design features:

- Expand US 41 on a revised alignment that would allow for a freeway split for southbound US 41 to southbound I-43 within the existing interchange footprint.
- Construct Collector-Distributor (C/D) roads on both sides of US 41 between Velp Avenue and I-43. The C/D roads would accommodate traffic weaving movements rather than having those movements occur on the US 41 freeway mainline.
- Extend the on and off ramps at the Velp Avenue interchange and realign them slightly to meet current design standards and accommodate roundabouts at the interchange ramp terminals.
- Make minor improvements to existing indirect loop ramp geometry at the I-43/US 41 System Interchange to accommodate the wider US 41 mainline. Additional lighting along with enhanced signing and marking will be added to mitigate the tight loop ramps.
- Improve the semi-directional ramp from southbound US 41 to southbound I-43, and the directional ramp from northbound I-43 to northbound US 41, to a 70 mph design speed.
- Maintain access from Velp Avenue to I-43 via US 41 as it is today.

Alternative D was retained for consideration as a reasonable build alternative because it meets project purpose and need. See Section 2 for more information.

Alternative E: US 41 expansion with Full Reconfiguration of I-43/US 41 Interchange

In addition to the common improvements for all build alternatives, Alternative E has the following key design features:

- Expand US 41 including a revised northbound alignment, and a raised northbound gradeline to accommodate the southbound US 41 to southbound I-43 ramp within the existing interchange footprint and the northbound I-43 to southbound US 41 flyover ramp piers and foundations.
- Reconstruct I-43/US 41 System Interchange with directional ramps (all loop ramps eliminated)
- In order to accommodate the FHWA recommended design speed for the direct ramps at the US 41/I-43 interchange, eliminate existing access between Velp Avenue and I-43 via US 41; Atkinson Avenue or an alternate route would be used to access southbound I-43 from Velp Avenue or to access Velp Avenue from northbound I-43.

Alternative E was retained for consideration as a reasonable build alternative because it meets project purpose and need. See Section 2 for more information.

Preferred Alternative

Build Alternatives D and E remained under consideration through the public hearing held on March 2, 2011. After reviewing public and agency input received during the public hearing and Draft EIS comment period that ended on March 28, 2011, WisDOT and FHWA have identified Alternative E, with key updates and design refinements summarized below, as the preferred alternative. See EIS subsection 2.4.2 for more information. It should be noted that these updates and refinements would also have been applicable under Alternative D.

Elimination of 5-Leg Roundabout at Velp Avenue Interchange

The 5-leg roundabout was presented at the March 2, 2011 public hearing as a possible design option for Alternatives D and E. This design option has now been eliminated from further consideration based on input from the Village of Howard (see February 18, 2011 letter in Appendix C, page C-26) and agency concerns about additional wetland impacts and other aspects of this design option. Agency correspondence concerning the 5-leg roundabout is found in Appendix C, pages C20 (DNR), C22 (EPA), and C23 (USACE).

Revised Beaver Dam Creek Realignment

The Beaver Dam Creek realignment at the Velp Avenue interchange has been revised slightly in the Island Court area to allow for a larger proposed stormwater detention pond at this location.

Extended Construction limits at County M/Lineville Road Interchange

For purposes of the Draft EIS, the construction limits at the County M interchange were just north of the County M structure over US 41. Based on additional engineering evaluation, including a Road Safety Audit, WisDOT proposes to extend the project's construction limits at County M farther north to include the reconstruction of the northern County M interchange ramps. This extension would minimize traffic impacts for potential future projects on US 41 to the north. It should be noted that this extension would also have been made under Alternative D. The refined construction limits would extend approximately 3,000 feet north of the County M bridge and the 6-lane to 4-lane transition would end just south of Woodfield Court.

Construction Access/Maintenance Roads

Since the Draft EIS, WisDOT has identified possible locations for access roads that will be needed for construction, maintenance and protection of the new structures at the I-43 interchange under Alternatives D and E. The access roads will initially be wide enough to accommodate construction equipment. After completion of the project, a portion of the temporary access road fill that was needed for construction equipment will be removed, leaving a narrower permanent road for future maintenance access. The need for permanent access roads and other clear areas around the new bridge abutments and piers is driven in part by renewed concern about bridge security by FHWA and AASHTO (American Association of State Highway and Transportation Officials). See new Final EIS subsection 3.18.10, Construction Access Roads, for more information.

Environmental Effects

Primary environmental effects for the Build Alternatives include wetland impacts, stream crossings/realignment, residential displacements, and impacts to public use lands. Exhibit S-2 lists the impacts that have been quantified for the No Build and Build Alternatives as presented in the Draft EIS.

New Exhibit S-3 compares updated impacts for Alternatives D and E based on the design refinements that have occurred since the Draft EIS and that would apply to both of these alternatives. See section 3 for more information.

Time Frame for Proposed Action

If a build alternative is selected for the proposed action, WisDOT anticipates that construction could begin in 2012. The construction schedule will depend on availability and prioritization of funds for the overall Brown County US 41 improvements and other statewide transportation projects.

Lead Agency/Cooperating and Participating Agencies

The environmental review process for the US 41 Memorial Drive to County M project is being conducted under the 2005 federal transportation bill, SAFETEA-LU (*Safe, Accountable, Flexible, Efficient Transportation Equity Act—A Legacy for Users*). SAFETEA-LU Section 6002, *Efficient Environmental Reviews for Project Decision making*, provides an opportunity for agencies, local officials and others to become cooperating or participating agencies in the environmental review process.

The Federal Highway Administration (FHWA) and WisDOT are joint lead agencies for the US 41 Memorial Drive to County M project and are responsible for managing the environmental review and documentation process.

Cooperating agencies are those that have jurisdiction by law or special expertise with respect to the project's environmental impacts. The U.S. Army Corps of Engineers (USACE) and the Wisconsin Department of Natural Resources (DNR) have agreed to be cooperating agencies for the project.

Participating agencies are those that have an interest in the project. The U.S. Department of the Interior Fish and Wildlife Service (Fish & Wildlife Service), Environmental Protection Agency (EPA), Bay-Lake Regional Planning Commission, and the Brown County Planning Commission/Green Bay Metropolitan Planning Organization have agreed to be participating agencies.

More information on the SAFETEA-LU environmental review process and agency responses is provided in Section 5.

Other Required Activities

Prior to construction of any Build Alternative requiring discharge of fill material into waters of the United States, including wetlands, authorization would be required from the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act. Such authorization is contingent on meeting Clean Water Act Section 404(b)(1) *Guidelines for Specification of Disposal Sites for Dredged or Fill Material* administered by the U.S. Environmental Protection Agency and the U.S. Army Corps of Engineers. These guidelines state that dredged or fill material should not be discharged into aquatic ecosystems, including wetlands, unless no other practicable alternatives are demonstrate, that such discharge will not have unacceptable adverse impacts, and that all practicable measures to minimize adverse effects are undertaken.

Clean Water Act authorization is also contingent on obtaining water quality certification from the Wisconsin Department of Natural Resources under Section 401 of the Clean Water Act and Wisconsin Administrative Code Chapter NR 299 (*Water Quality Certification*).

Property acquisition and residential or business relocations will be in accordance with the Uniform *Relocation Assistance and Real Property Acquisition Policies Act of 1970* as amended (49 CFR Part 24).

Regulatory Compliance

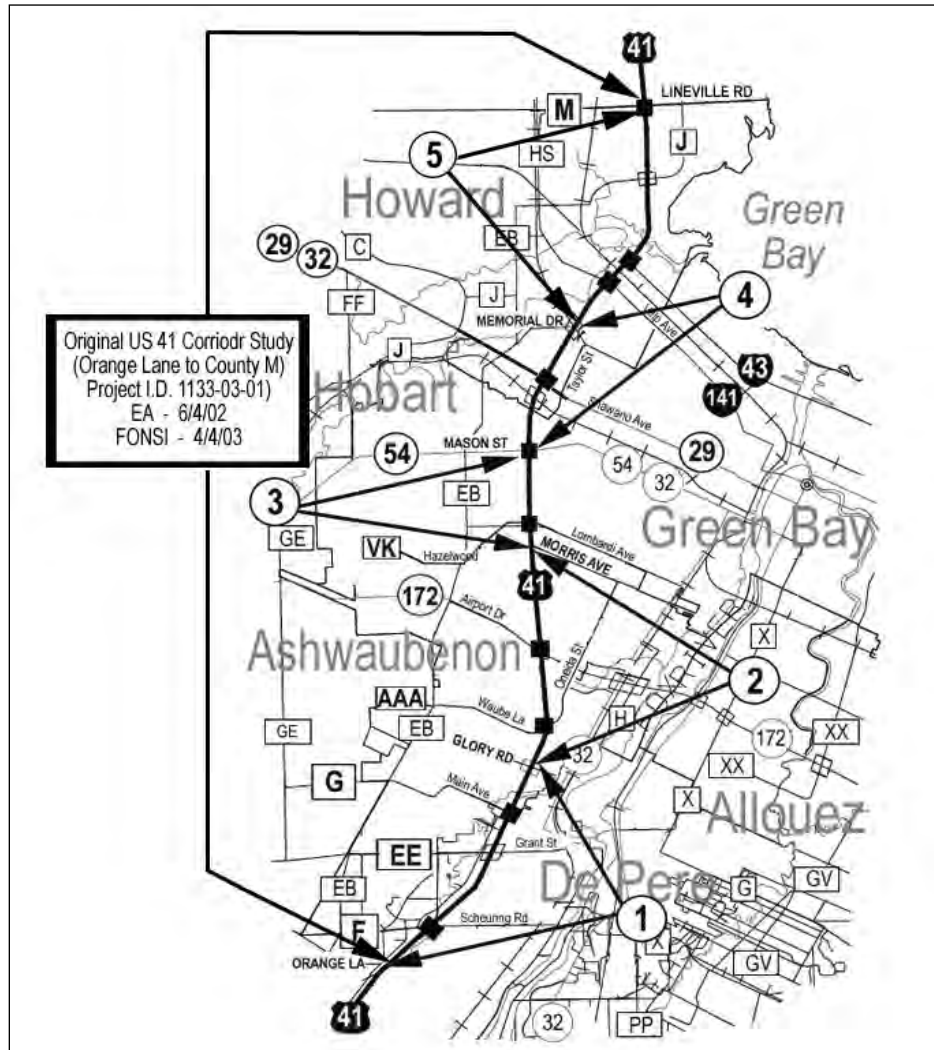
Planning, agency coordination, community involvement and impact evaluation for the project has been conducted in accordance with the National and Wisconsin Environmental Policy Acts, Clean Water Act, Clean Air Act, Fish and Wildlife Coordination Act, Endangered Species Act, National Historic Preservation Act and other federal and state laws, policies, and procedures for environmental impact analysis and preparation of environmental documents.

This document is in compliance with U.S. Department of Transportation and FHWA policies for implementing *Presidential Executive Order on Environmental Justice 12898—Federal Actions to Address Environmental Justice in Minority and Low-income Populations*. Neither minority nor low-income populations will have disproportionate adverse impacts under the Build Alternatives.

Local Concerns and Unresolved Issues

There are no known local concerns or unresolved issues with respect to the alternatives and impacts considered in this EIS. All known concerns and issues have been addressed to the extent practicable based on the level of engineering detail and environmental information available for purposes of preparing the EIS.

US 41 Brown County Project Sections



LEGEND

- 1. Orange Lane to Glory Road**
(Project I.D. 1133-06-00)
 - Re-evaluation of the original 2002 EA for Scheuring Road Interchange - 7/1/09
 - Re-evaluation of the original 2002 EA for remainder of project section - 9/4/09
- 2. Glory Road to Morris Avenue**
(Project I.D. 1133-09-00)
 - Re-evaluation of the original 2002 EA - 10/9/09
 - Re-evaluation update 3/15/11
- 3. Morris Avenue to Mason Street**
(Project I.D. 1133-03-02)
 - Re-evaluation of the original 2002 EA - 4/1/10
- 4. Mason Street to Memorial Drive**
US 41 leg (Project I.D. 1133-03-02)
WIS 29 leg County J to US 41 (Project I.D. 9202-07-01/02)
 - New EA 9/10/09
 - FONSI 1/8/10
- 5. Memorial Drive to County M**
(Project I.D. 1133-10-01)
 - New Draft EIS 1/24/11

Exhibit S-1

Impact Summary Table
For Alternatives as Presented in Draft EIS

Environmental Factors	Alternative A No Build ¹	Alternative B ² US 41 expansion with minor ramp improvements to I-43/US 41 Interchange (Eliminated from further study) ³	Alternative C ² US 41 expansion with C/D roadways between Velp Ave and I-43 (Eliminated from further study) ⁴	Alternative D ² US 41 expansion with C/D roadways between Velp Ave and I-43 and compatibility of I-43/US 41 interchange to full reconfiguration	Alternative E ² US 41 expansion with full reconfiguration of I-43/US 41 interchange
Construction Cost Estimate (2010 \$)	NA	\$155 M	\$205 M	\$220 M	\$230 M
New right-of-way (acres)	0	13	30	29	37
Residential Displacements	0	13	13	13	13
Business Displacements	0	1	1	1	1
Stream Crossings	0	2 Beaver Dam Creek (realignment required) Duck Creek	3 Beaver Dam Creek (realignment required) Duck Creek (2 locations)	2 Beaver Dam Creek (realignment required) Duck Creek	2 Beaver Dam Creek (realignment required) Duck Creek
Wetland Impacts ⁵ (acres)	0	42	49	55	54
Threatened or Endangered Species ⁶	No	Possible	Possible	Possible	Possible
Archaeological Sites	0	0	0	0	0
Historic Structures	0	0	0	0	0
Public Use Land (acres)	0	2.2 <ul style="list-style-type: none">Wietor Wharf Park (1.7) embankment fillDeerfield Docks (0.1) embankment fillGordon Nauman Cons. Area (0.15) embankment fillDNR Peat's Lake unit (0.2) parcel east of US 41 (frontage road cul-de-sac)	13.6 <ul style="list-style-type: none">Wietor Wharf Park (0.9) embankment fill, boardwalkDeerfield Docks (0.55) embankment fill, boardwalkGordon Nauman Cons. Area (0.55) embankment fillDNR Peat's Lake units (11.6) parcel along I-43 (severance) parcel west of US 41 (severance) parcel east of US 41 (frontage road cul-de-sac)	8.4 <ul style="list-style-type: none">Wietor Wharf Park (0.8) embankment fill, boardwalkDeerfield Docks (0.55) embankment fill, boardwalkGordon Nauman Cons. Area (0.55) embankment fillDNR Peat's Lake units (6.5) parcel along I-43 (severance) parcel east of US 41 (frontage road cul-de-sac)	12.2 <ul style="list-style-type: none">Wietor Wharf Park (0.4) embankment fillDeerfield Docks (0.1) embankment fillGordon Nauman Cons. Area (1.1) embankment fillDNR Peat's Lake units (10.6) parcel along I-43 (severance) parcel east of US 41 (frontage road cul-de-sac)
Section 4(f) Evaluation Required	No	Yes Gordon Nauman Cons. Area 2 DNR Peat's Lake units (parcel along I-43 and parcel east of US 41)	Yes Gordon Nauman Cons. Area 2 DNR Peat's Lake units (parcel along I-43 and parcel east of US 41)	Yes Gordon Nauman Cons. Area 2 DNR Peat's Lake units (parcel along I-43 and parcel east of US 41)	Yes Gordon Nauman Cons. Area 2 DNR Peat's Lake units (parcel along I-43 and parcel east of US 41)
Section 6(f) or Similar Compensation Required ⁷	No	Yes 1 DNR Peat's Lake unit (parcel east of US 41)	Yes Wietor Wharf Park (boardwalk) Deerfield Docks Park (boardwalk) 2 DNR Peat's Lake units (parcel along I-43 and parcel east of US 41)	Yes Wietor Wharf Park (boardwalk) Deerfield Docks Park (boardwalk) 2 DNR Peat's Lake units (parcel along I-43 and parcel east of US 41)	Yes 2 DNR Peat's Lake units (parcel along I-43 and parcel east of US 41)
Contaminated Sites (petroleum)	0	3	3	3	3
Environmental Justice Concerns	No	No	No	No	No

NOTES:

1. The No Build Alternative does not address the project's key purpose and need factors and therefore is not a viable course of action. It serves as a baseline of comparison to the build alternatives.

2. Proposed improvements common to all of the Build Alternatives include the following:

- Widen the US 41 freeway mainline from 4 to 6 lanes and add auxiliary lanes along northbound and southbound US 41.
- Reconstruct the US 141/Velp Avenue interchange including roundabouts at the ramp terminals and at the US 141 (Velp Avenue)/Memorial Drive intersection.
- Reconstruct the County M interchange including roundabouts at the ramp terminals and at the County M/frontage road intersections.
- Construct new bridges over US 141/Velp Avenue, Canadian National (CN) Railroad, I-43, Wietor Drive, and Duck Creek.
- Replace the County EB/Lakeview Drive and County M bridges over US 41.
- Construct a new frontage road with a five-legged roundabout at the US 141/Velp Avenue interchange ramp terminal west of US 41.
- Realign Beaver Dam Creek and replace the box culvert south of US 141/Velp Avenue interchange.
- Build stormwater detention ponds along US 141/Velp Avenue and County EB/Lakeview Drive.
- Maintain the existing separation distance between the US 41 mainline and the frontage roads from I-43 to County M.

3. Alternative B has been eliminated from further consideration as a reasonable build alternative because it does not address the operational and safety issues resulting from the short weaving section along the US 41 mainline.

4. Alternative C has been eliminated from further consideration as a reasonable build alternative because of the substantial impacts to Section 4(f) resources compared to Alternatives D and E that address project purpose and need. In addition, Alternative C would impact and fragment higher quality wetlands compared to Alternatives D and E due to the southbound US 41 to southbound I-43 flyover ramp.

5. Wetland impacts include areas under proposed bridges that will not be directly filled by the proposed improvements. Total acreage shown includes 1.1 acres of additional impacts for the 5-legged roundabout option in the northwest quadrant of the US 141/Velp Avenue interchange.

6. Previous information from the U.S. Fish & Wildlife Service indicates there are no known federally-listed threatened or endangered species in the project's are of potential effect. Previous information from DNR indicates the project area could provide habitat for the following species:

- Blanding's turtle and Wood turtle (endangered)
- Common tern (endangered)
- Black crowned night heron, Cattle egret (special concern)

7. Peat's Lake unit along I-43 has utilized LWCF and ORAP funds. Peat's Lake unit east of US 41 utilized Pittman-Robertson and ORAP funds. Wietor Wharf Park utilized Dingell-Johnson funds for boardwalk. Deerfield Docks Park utilized Dingell-Johnson funds for boardwalk and pier.

**Impact Comparison Table
For Alternatives D and E as Updated in Final EIS**

Environmental Factors	Alternative D US 41 expansion with C/D roadways between Velp Avenue and I-43 and freeway split configuration	Alternative E (Preferred Alternative) US 41 expansion with full reconfiguration of I-43/US 41 interchange
Construction Cost Estimate (2010 \$) ¹	\$220 M	\$230 M
New right-of-way (acres)	28	36
Residential Displacements ²	15	15
Business Displacements ²	2	2
Stream Crossings	2 Beaver Dam Creek (realignment required) Duck Creek	2 Beaver Dam Creek (realignment required) Duck Creek
Wetland Impacts (acres) ³	60	61
Threatened or Endangered Species ⁴	Possible	Possible
Archaeological Sites and Historic Structures	0	0
Public Use Land (acres) ⁵	9.3 <ul style="list-style-type: none"> Wietor Wharf Park (0.8) embankment fill, boardwalk Deerfield Docks (0.55) embankment fill, boardwalk Gordon Nauman Cons. Area (0.55) embankment fill DNR Peat's Lake units (7.4); parcel along I-43 (severance plus maintenance access road) parcel east of US 41 (frontage road cul-de-sac) 	13.8 <ul style="list-style-type: none"> Wietor Wharf Park (0.75) embankment fill and bike/pedestrian path Deerfield Docks (0.5) embankment fill and bike/pedestrian path Gordon Nauman Cons. Area (1.1) embankment fill DNR Peat's Lake units (11.5); parcel along I-43 (severance plus maintenance access road) parcel east of US 41 (frontage road cul-de-sac)
Section 4(f) Evaluation Required	Yes Gordon Nauman Conservation Area 2 DNR Peat's Lake units (parcel along I-43 and parcel east of US 41)	Yes Gordon Nauman Conservation Area 2 DNR Peat's Lake units (parcel along I-43 and parcel east of US 41)
Section 6(f) or Similar Compensation Required ⁶	Yes Wietor Wharf Park (boardwalk) Deerfield Docks Park (boardwalk) 2 DNR Peat's Lake units (parcel along I-43 and parcel east of US 41)	Yes 2 DNR Peat's Lake units (parcel along I-43 and parcel east of US 41)
Contaminated Sites (petroleum)	3	3
Environmental Justice Concerns	No	No

Notes:

- Construction cost estimates do not include design, real estate acquisition, or utility relocations.
- Two additional residential displacements, one of which is also a business, due to larger stormwater pond and revised Beaver Dam Creek realignment at Velp Avenue interchange (see section 3.5.1 for more information).
- Wetland impacts include areas under proposed bridges that will not be directly filled by the proposed improvements, and impacts due to permanent maintenance access roads for construction of bridges at Velp Avenue and I-43 interchanges. Impacts due to 5-leg roundabout have been eliminated (see section 3.7.1 for more information).
- Previous information from the U.S. Fish & Wildlife Service indicates there are no known federally-listed threatened or endangered species in the project's area of potential effect. Previous information from DNR indicates the project area could provide habitat for the following species:
 - Blanding's turtle and Wood turtle (endangered)
 - Common tern (endangered)
 - Black crowned night heron, Cattle egret (special concern)
- Additional public use land impacts due to maintenance access roads (see section 4.7 for more information).
- Peat's Lake units along I-43 utilized LWCF and ORAP funds. Peat's Lake unit east of US 41 utilized Pittman-Robertson and ORAP funds. Wietor Wharf Park utilized Dingell-Johnson funds for boardwalk. Deerfield Docks Park utilized Dingell-Johnson funds for boardwalk and pier.

Exhibit S-3

SECTION 1

Purpose and Need for Proposed Action

SECTION 1

Purpose and Need for Proposed Action

Introduction

Section 1 describes the purpose and need for proposed improvements in the Memorial Drive to County M section of the US 41 corridor in Brown County. Purpose and need factors encompass existing problems and those anticipated to occur by the project's design year (2035).

1.1 Proposed Action

The Wisconsin Department of Transportation (WisDOT), in consultation with the Federal Highway Administration (FHWA), is proposing to reconstruct US 41 from Memorial Drive to County M, a length of approximately 3.3 miles in Brown County, Wisconsin (see Location Map inside front cover).

Proposed improvements include reconstructing the interchanges at US 141/Velp Avenue, I-43 and County M to meet current design standards, adding an additional lane in each direction on the US 41 mainline, adding auxiliary lanes along US 41 in both directions, constructing new bridges along US 41 over Velp Avenue, CN Railroad, Wietor Drive, I-43, and Duck Creek, and replacing the County EB/Lakeview Drive structure and the County M structure over US 41.

In addition, roundabouts would be constructed at the Velp Avenue interchange ramp terminals, the Velp Avenue/Memorial Drive intersection east of US 41, the County M interchange ramp terminals, and the frontage road intersections with County M. WisDOT is committed to using roundabouts where appropriate based on the following benefits of roundabouts compared to signalized intersections:

- Roundabouts improve safety by providing slower intersection entry speeds and minimizing the potential for turning movement conflicts.
- Roundabouts provide more intersection capacity than signalized intersections, resulting in less delay for traffic entering and exiting the intersections.
- Roundabouts have lower impact collisions due to the intersection entry angle.
- Roundabouts generally have lower maintenance costs than signalized intersections.

Other improvements include realigning Beaver Dam Creek in the southwest quadrant of the Velp Avenue interchange, constructing stormwater detention ponds at the Velp Avenue interchange and near the County EB/Lakeview Drive overpass, and constructing crash investigation sites along the northbound and southbound off ramps at the Velp Avenue and County M interchanges. Crash investigation sites are pull out areas that help minimize traffic backups and delay by allowing vehicles involved in minor crashes to move off the freeway. Providing crash investigation sites is a US 41 corridor wide application. More detailed information on the proposed action is provided in Section 2.

1.2 Purpose of Proposed Action

The purpose of the proposed action is to make transportation improvements in the US 41 corridor as described in Section 1.1, and as supported by the need factors in Section 1.3. Key objectives of the proposed improvements include the following:

- Meet traffic demand and mobility needs including future conversion of US 41 to an Interstate Highway
- Improve traffic flow and safety on US 41 and its interchanges
- Address geometric and operational deficiencies
- Provide reasonable and safe local access while at the same time preserving freeway operations and safety
- Minimize impacts to the natural and built environment to the maximum extent practicable.

1.3 Need for Proposed Action

The need for the proposed action is based on a combination of factors that include system linkage and route importance (including possible future conversion of US 41 to an Interstate Highway), traffic demand/operations, existing highway deficiencies, and safety concerns. The remainder of Section 1 discusses these factors.

1.3.1 System Linkage and Route Importance

US 41 and I-43 provide a vital north-south transportation link with trip lengths and travel densities of an interstate or inter-regional nature. US 41 connects the Chicago-Milwaukee metropolitan area with the Fox River Valley industrial area and recreational areas of northeastern Wisconsin and upper Michigan. US 41 is a multi-lane principal arterial highway under WisDOT's *Connections 2030* Plan developed to provide a network of high quality highways linking the state's economic centers, and designed with maximum service and safety characteristics. US 41 is also a component of the National Highway System (NHS). Highways in the NHS serve major population centers, multimodal transportation facilities, and meet national defense requirements.

US 41 and I-43 are designated as long truck routes by the 2009 Wisconsin Long Truck Operators Map. This designation allows trucks up to 65 feet in length to use these highways and exemplifies the importance of the US 41 corridor to commercial interests within and outside the state.

The 2005 federal transportation bill, SAFETEA-LU (*Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users*) includes the future conversion of US 41 to an Interstate facility between Milwaukee and I-43 in Green Bay. A study for the Interstate conversion is being conducted under a separate WisDOT project. Improvements made to US 41 will not preclude future conversion of US 41 to an Interstate Highway. Improvements made to I-43 will need to meet interstate standards. See 'Existing Highway Deficiencies' for more information.

Within the project area, US 41 and I-43 serve the City of Green Bay, Village of Howard, Village of Suamico, and surrounding communities. The regional and local plans for these communities include the US 41 expansion project. The plans include the *Green Bay Metropolitan Planning Organization Long-Range Transportation Plan* completed in November 2005 and amended in 2007, and the *Brown County Comprehensive Plan* completed by the Brown County Planning Commission in October 2004. Current and planned growth and development in these communities contributes a high volume of commuter traffic and heavy truck traffic on both freeways.

Summary: System linkage and route importance are key factors in developing improvements that enhance regional and local mobility and that are compatible with the possible future conversion of US 41 to an Interstate Highway.

1.3.2 Traffic Demand/Operations

Existing and Forecast Traffic

Traffic volumes are expressed as Annual Average Daily Traffic (AADT) volumes that reflect average travel conditions rather than daily or seasonal fluctuations. According to the US 41 Traffic Study – Brown County Forecasted Traffic Volume Network memo prepared for WisDOT by CH2MHill in 2007, existing peak hour and AADT volumes were obtained from traffic counts of the mainline segments and ramps, and from intersection turning movements. The year 2035 AADT forecasts were provided from the regional travel demand model.

Existing and forecasted traffic is summarized in Table 1-1. The traffic data covers existing traffic (2005) through design year 2035. The existing traffic in 2005 was compared to more recent traffic counts in 2009, and there was not a significant difference.

**Table 1-1
Existing and Forecast Traffic (2005 – 2035)**

Roadway Segment	Existing Traffic 2005 AADT	Future Traffic 2015 AADT	Future Traffic 2035 AADT	Percent Increase (2005-2035)
US 41 Mainline, Memorial Drive to Velp Avenue	61,200	73,400	97,700	60%
US 41 Mainline, Velp Ave to I-43	56,800	69,300	94,400	66%
US 41 Mainline, I-43 to County M	50,200	60,300	80,500	60%
I-43, Atkinson Drive to US 41	38,400	44,200	55,700	45%

The alignment diagrams (Figures 1-1 through 1-3) illustrate traffic volumes (AADT) on the US 41 mainline, ramps and sideroads.

**Figure 1-1
Existing AADT (Year 2005)**

Source: US 41 Traffic Study – Brown County Forecasted Traffic Volume Network Memo. CH2MHill®, January 2007.

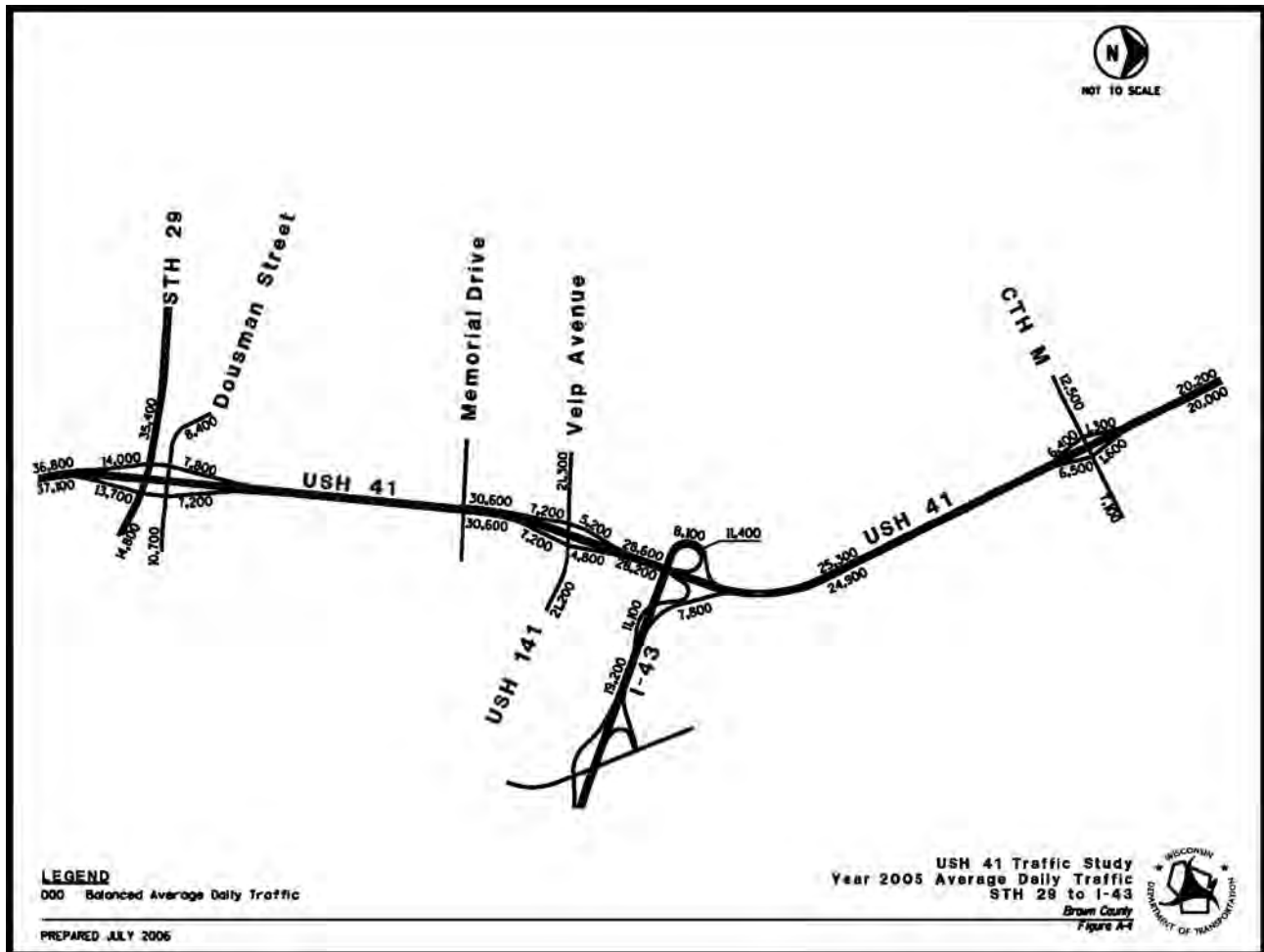
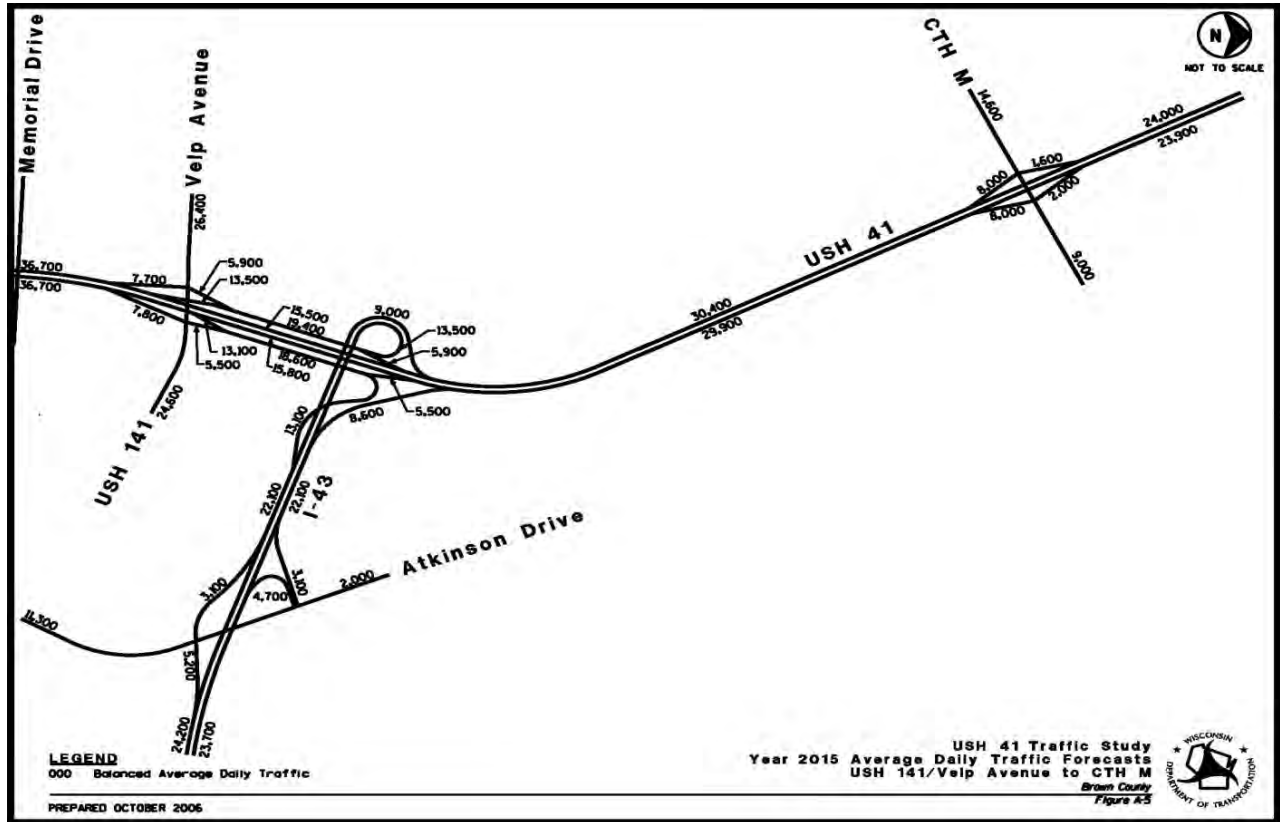
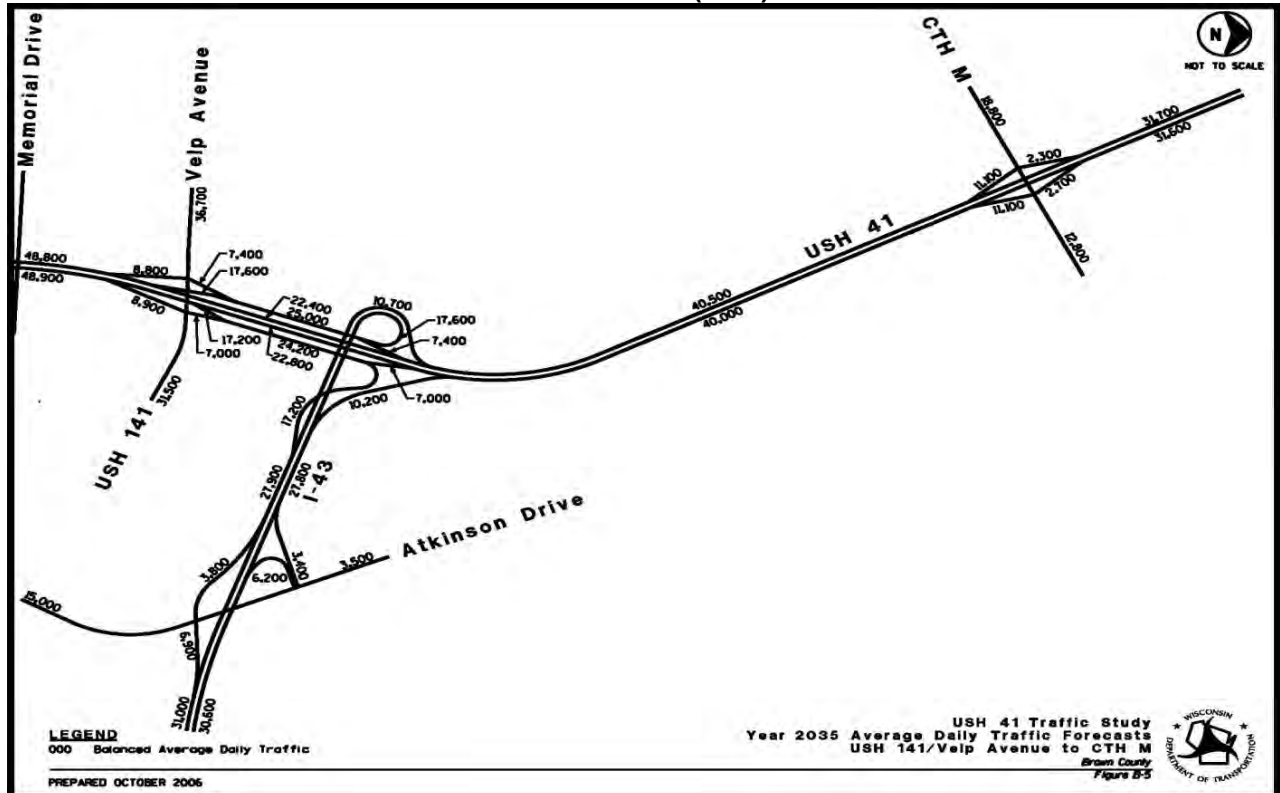


Figure 1-2
Future AADT (2015)



Source: US 41 Traffic Study – Brown County Forecasted Traffic Volume Network Memo. CH2MHill®, January 2007.

Figure 1-3
Future AADT (2035)



Source: US 41 Traffic Study – Brown County Forecasted Traffic Volume Network Memo. CH2MHill®, January 2007.

According to WisDOT's Facilities Development Manual (FDM), Procedure 11-15-1, Figure 1, 60,000 AADT is the threshold volume that can be safely handled at an acceptable service level on a 4-lane backbone highway. Current traffic volumes on US 41, between Memorial Drive and Velp Avenue are already above this threshold, and the segments of US 41 between Velp Avenue and County M will meet or exceed this threshold by 2015. Therefore, improvements on US 41 that address traffic capacity and mobility are warranted such as additional through lanes and auxiliary lanes, and improvements that separate regional and local traffic movements.

The number and size of trucks in the traffic stream affects traffic operations, safety and contributes to the level of congestion. On US 41, trucks comprise approximately 10.9% of the AADT according to WisDOT's forecasts for design year 2035. The level of truck traffic should also be taken into consideration for design purposes, since trucks take more time to change lanes, occupy more roadway space, require more turning room, and consequently have a greater effect on traffic flow and congestion than passenger vehicles.

Level of Service (LOS)

Level of Service measures a highway's ability to handle traffic. LOS is affected by factors such as AADT volumes, peak hour volumes, truck traffic, number of driving lanes, lane width, vertical grades, ability to pass, and presence or absence of traffic signals. The *Highway Capacity Manual 2000* (Transportation Research Board Special Report 209) establishes guidelines for the appropriate LOS on various types of highways. LOS values range from A (free flow conditions) to F (conditions over capacity).

WisDOT also uses a numeric LOS scale which was developed to balance the social, environmental, and monetary costs of using LOS C as the performance threshold against the costs of accepting more congestion on the state's highways before capacity improvements are considered. Both alpha and numeric LOS values are provided in Table 1-2.

**Table 1-2
Level of Service (LOS) Values and Descriptions**

LOS Alpha Scale	LOS Numeric Scale	Description
A	1.01 to 2.00	No Congestion
B	2.01 to 3.00	No Congestion
C	3.01 to 4.00	Minimal Congestion
D	4.01 to 5.00	Moderate Congestion
E	5.01 to 6.00	Severe Congestion
F	6.01 or higher	Extreme Congestion

The acceptable LOS for *Connections 2030* backbone highways is LOS C, according to WisDOT's Facilities Development Manual (FDM), Procedure 11-5-3, and as shown in Table 1-3.

**Table 1-3
Acceptable Levels of Service**

Highway System Type	Rural and Small Urban Areas	Urbanized Areas with Population > 50,000	Acceptable Level of Service (LOS) Established for Project
Corridors 2020 Backbone Routes (US 41 is also a NHS route)	LOS C (< = 4.0)	LOS C (< = 4.0)	LOS C (< = 4.0) (US 41 and I-43)
Corridors 2020 Connector Routes and NHS Routes (not including NHS Backbone Routes)	LOS C (< = 4.0)	Mid LOS D (< = 4.5)	
Other Principal Arterials	LOS D (< = 5.0)	Mid LOS E (< = 5.5)	
Minor Arterials	LOS D (< = 5.0)	Mid LOS E (< = 5.5)	
Collectors & Local Function Roads	LOS D (< = 5.0)	Mid LOS E (< = 5.5)	

According to the *US 41 EIS Paramics Traffic Operations Report* prepared for WisDOT by Strand Associates in 2010, US 41 and I-43 freeway operations were analyzed under the existing conditions and future no build conditions. In the existing conditions, all but two of the freeway segments in the study area operate at a LOS C or better. The southbound basic and diverge segments on US 41 between Velp Avenue and WIS 29 operate at LOS D in the AM peak hour.

In the future, many of the freeway segments within, and around this study area will be nearing or exceeding capacity. As shown in Table 1-4, the AM peak hour has a poor LOS for southbound traffic, while the PM peak hour has substantially worse traffic operations for northbound vehicles, and demonstrates the need for an improvement in the study area. The projected average speeds on each of the four unacceptable LOS freeway segments listed in Table 1-4 are less than 20 miles per hour.

Table 1-4
Design Year 2035 LOS for Freeway Sections

LOS (Numeric scale)	Freeway Section	Peak Hour
LOS E (5.58)	US 41 from Velp Avenue to Mason Street – southbound	AM
LOS D (4.53)	US 41 from Velp Avenue to County M – southbound	AM
LOS F (>6)	US 41 from Mason Street to County M – northbound	PM
LOS F (>6)	I-43 from Webster Avenue to US 41 – northbound	PM

The Paramics Traffic Operations Report showed the network will have substantial congestion in design year 2035 at the existing signalized intersections throughout the corridor during both AM and PM peak hours. All but the Velp Avenue/Atkinson Avenue intersection would operate at LOS E or LOS F. The unsignalized intersections listed in Table 1-5 have failing approach movements (LOS F) in the PM peak hour:

Table 1-5
Design Year 2035 Unsignalized Intersections Operating at LOS F

LOS	Freeway Section/Intersection	Peak Hour
LOS F	Velp Avenue and Island Court – northbound and eastbound	PM
LOS F	Velp Avenue and Memorial Drive – westbound and northbound	PM
LOS F	County M and West Deerfield Avenue – northbound and southbound	PM
LOS F	County M and US 41 Northbound Ramps – northbound	PM
LOS F	County M and East Deerfield Avenue – northbound and southbound	PM
LOS F	Atkinson Avenue and I-43 Northbound Ramps – eastbound	PM

Summary: The effect of increased congestion on mobility in the US 41 corridor and within the interchange areas is a key factor in developing proposed improvements that separate local and regional traffic movements to the extent possible. Traffic increases on US 41 will make merge/diverge operations more difficult and dangerous. Without capacity expansion on US 41 and geometric improvements to its interchanges, delays on US 41 will increase and safety problems will worsen.

1.3.3 Existing Highway Deficiencies

The existing US 41 freeway mainline and its interchanges within the project area were constructed over 35 years ago and designed to handle lower volume traffic conditions. The construction AADT when US 41 was previously built from Velp Avenue to County M was 15,450, with a design year (1990) AADT of 23,300. There have been some improvements since then to increase the capacity of the interchanges, but they do not meet current design standards. The traffic demand is evidence of US 41 subsequent designation as a backbone highway under *Connections 2030*, its designation as a National Highway System (NHS) route, and as a possible future Interstate highway under SAFETEA-LU.

The US 41 mainline and interchanges are exhibiting signs of deterioration due to aging of the roadway infrastructure, bridges, drainage structures, guardrail and barrier walls. US 41 from Memorial Drive to County M has been overlaid with asphalt once since the original concrete pavement was constructed in 1970-71. The asphalt overlay on US 41 occurred in 1999 north of Duck Creek, and in 2003 south of Duck Creek. I-43 was originally constructed with concrete in 1978, and overlaid with asphalt in 2002. The Pavement Distress Index (PDI) value is 14.50, as surveyed in 2003. A PDI value of 100 is excellent, and a value of less than 50 is considered poor. A low PDI can contribute to a diminishing return on investment for resurfacing US 41 in the future.

Inadequate traffic capacity due to lack of channelization for turning movements and/or lack of intersection traffic control at ramp terminal intersections is also of concern at these interchanges. See the previous section addressing LOS deficiencies at the intersections within the project area.

The existing US 41 northbound and southbound roadway lanes are 12 feet wide, the median is 60 feet wide (measured between yellow marked edgelines, of opposing lanes), the shoulders adjacent to the median side are 6 feet wide, and the outside shoulders are 10 feet wide. Existing I-43 is also a four-lane divided freeway with the same geometry as US 41, except that the median is 64 feet wide. The existing US 41 roadway typical section is sufficient for existing traffic conditions. However, the typical section for the design year 2035 traffic volumes requires additional capacity on US 41, additional shoulder width, and therefore additional structure width.

Except for the Military Avenue structure over I-43, none of the grade separation structures in the project corridor meet current design standards for vertical clearance. The deficient vertical clearances are shown in bold in Table 1-6. The design standards are 14.75 feet full clearance for local roads and 16.75 feet full clearance for state and county highways, according to WisDOT's Facilities Development Manual (FDM), Procedure 11-35-1.

Table 1-6
Grade Separation Structures

Structure Number	Structure Location	Existing Minimum Vertical Clearance (feet)	Roadway Width (feet)
B-05-0064	US 41 SB over US 141 SB	14.9	39.0
B-05-0065	US 41 NB over US 141 SB	14.9	39.0
B-05-0068	US 41 SB over I 43 SB	16.2	49.9
B-05-0069	US 41 SB over I 43 SB	16.5	49.9
B-05-0227	Military Avenue over I 43	16.8	45.5
B-05-0129	County EB (Lakeview Dr) over US 41	16.3	44.0
B-05-0130	County M (Lineville Rd) over US 41	16.4	71.0

Note: Dimensions shown in bold are substandard

There are access control spacing deficiencies in the project area. Per WisDOT's FDM, Procedure 11-5-5, the minimum standard for separation distance between interchange ramp terminals and adjacent side roads is 1,000 feet and the desirable distance is 1,320 feet. Table 1-7 lists the locations where the separation distance between interchange ramp terminals and adjacent side roads does not meet current design standards.

Table 1-7
Locations with Inadequate Separation Between
Interchange Ramps and Side Roads

Interchange Ramp Intersection	Adjacent Side Road Intersection	Separation Distance (feet)
Velp Avenue and US 41 NB ramp terminal	Memorial Drive and Velp Avenue	350
Velp Avenue and US 41 SB ramp	Island Court and Velp Avenue	500
County M and US 41 NB ramp terminal	East Deerfield Avenue and County M	385
County M and US 41 SB ramp terminal	West Deerfield Avenue and County M	385

There are also several locations where the frontage roads along both sides of US 41 between Duck Creek and County M (East and West Deerfield Avenue) do not meet current design standards for separation distance between the edge of the highway and the frontage road. Per WisDOT's FDM, Procedure 11-25-45, the required distance between the edge of the through lane on a rural arterial highway and the edge of the through lane on the frontage road is 85 feet minimum and 115 feet desirable. In some areas, the existing separation distance between US 41 and these frontage roads is 50-60 feet.

The tight loop ramps at the I-43 interchange have design speeds that are less than desirable for System Interchanges (freeway to freeway interchange). Most of the existing ramp design speeds are less than 50% of the freeway mainline design speeds. Per FDM Procedure 11-30-1, the ramp design speed for freeway to freeway interchanges should be within 85% of the freeway mainline design speed, and no lower than 10 mph below the mainline design speed. For US 41 and I-43, the design speed is 70 mph, therefore the ramp design speed should be a minimum of 60 mph for a Systems Interchange.

Table 1-8 lists the design speeds for each of the existing ramps at the US 41/I-43 interchange.

Table 1-8
Existing Horizontal Design Speeds
For the Tight Loop Ramps at US 41/I-43 Interchange

Interchange Ramp Direction	Existing Design Speed (mph)	Ramp Type
Northbound US 41 to Southbound I-43	30	Loop
Northbound I-43 to Northbound US 41	45	Directional
Southbound US 41 to Southbound I-43	35	Semi-directional
Northbound I-43 to Southbound US 41	30	Loop

According to the 2004 American Association of State Highway and Transportation Officials (AASHTO) Geometric Design of Highways and Streets (GDHS), a guide value for ramp design speed as related to highway design speed is that a directional ramp (Northbound I-43 to Northbound US 41 ramp) should be designed for a 50-60 mph speed, a semi-directional ramp (Southbound US 41 to Southbound I-43 ramp) should be designed for a 50-60 mph speed, and loop ramps should be designed for a minimum of 30 mph (Northbound US 41 to Southbound I-43 ramp and Northbound I-43 to Southbound US 41 ramp)

The speed differential between the freeway mainline and the loop ramps increase the potential for vehicles to run off the road if speed isn't sufficiently reduced to negotiate the controlling loop ramp radius. All four of the US 41/I-43 interchange ramps have a substandard superelevation (banking of the curved roadway so it can be safely maneuvered at reasonable speeds). Per FDM Procedure 11-30-1, the maximum superelevation rate for ramps is 6 percent. The maximum superelevation rate that currently exists on all four of the US 41/I-43 interchange ramps is 8 percent. In addition, all the ramps have an outside shoulder width of 8 feet, which is less than the current minimum design standard of 10 feet for a system ramp.

The lengths of the exit ramps on diamond-type interchanges are typically in the range of 900 to 1,200 feet from the crossroad terminal to the point where the mainline shoulder meets the ramp shoulder, according to FDM Procedure 11-30-1. The exit ramps for Velp Avenue both have substandard length. The southbound exit ramp is 800 feet long, and the northbound exit ramp is 850 feet long.

The proximity of the interchanges at Velp Avenue and I-43 causes operational deficiencies and safety concerns due to inadequate traffic weaving distances. Desirable interchange spacing in urban areas is 1 mile. The Velp Avenue interchange is less than 1/3 mile from the I-43 interchange.

Traffic weaving occurs along US 41, between the Velp Avenue interchange northbound on ramp and the I-43 interchange southbound off ramp, and along US 41 between the I-43 southbound on ramp and the Velp Avenue interchange southbound off ramp. The deficiency in interchange spacing leads to weaving conflicts, which has an effect on LOS, traffic capacity, lane speed differential, and safety. According to the 2004 AASHTO GDHS a guideline of 2,000 feet is the minimum recommended length between successive ramps. The existing weave distance is approximately 1,400 feet along northbound US 41 between the on-ramp from Velp Avenue to the off-ramp to southbound I-43, and approximately 1,430 along southbound US 41 between the on-ramp from northbound I-43 to the off-ramp to Velp Avenue, neither of which meets the 2,000 feet guideline for weaving distances.

Summary: Reconstruction of the US 41 mainline and its interchanges is required to improve traffic operations and capacity and to address existing deficiencies.

1.3.4 Safety

Highway safety is measured by the frequency and severity of crashes. An important objective of proposed improvements in the US 41 corridor is to minimize crash potential through roadway mainline and intersection design features and access management.

There was one fatality along US 41 mainline, between I-43 and County M, in the reporting period 2005 to 2007. The fatal crash involved a sideswipe-same direction of two southbound vehicles south of the County EB overpass. The average annual fatal crash rate is 0.8 hundred million vehicles miles traveled (HVMVT) for US 41 between I-43 and County M, which is above the statewide average crash rate (2005-2007) of 0.5 HVMVT.

Table 1-9 presents crash data for the US 41 mainline from 2005 through 2007. Table 1-9 includes segment lengths, traffic volumes (AADT) and total crashes, which are used to develop the crash rates for comparison to statewide average crash rates for rural interstate highways. The statewide average crash rate for the reporting period (2005-2007) was 62 crashes per hundred million vehicles miles traveled (HVMVT), and the statewide average injury and fatal crash rate is 18.9 crashes per HVMVT. As indicated in Table 1-9, the US 41 segment between Velp Avenue and I-43 has the highest crash rate, 121 crashes per HVMVT. The short distance, which includes the weaving movements between interchanges, used in the equation for determining the crash rate per HVMVT results in a high crash rate between Velp Avenue and I-43. All crash data and statewide average crash rates, exclude accidents that involve deer.

**Table 1-9
US 41 and I-43 Mainline Crash Data (2005-2007)**

Roadway Segments	Segment Length (miles)	AADT (2006)	Total Crashes	Average Annual Total Crash Rate (HMVMT)	Average Injury and Fatal Crash Rate (HMVMT)
US 41 mainline (Memorial Drive to Velp Ave)	0.8	57,200*	32	64	14.0
US 41 mainline (Velp Avenue to I-43)	0.40	52,900	28	121	30.2
US 41 mainline (I-43 to County M)	2.30	47,300	58	49	15.1
I 43 (US 41 to Atkinson Drive)	2.0	34,600	16	21	9.2

Note: Rates shown in bold are substandard

* AADT 2006 from WisDOT website, US 41 Detail, Brown County

Source: Crash Analysis Data for ID 1133-10-00 Projects. Strand Associates®, February 2010.

Each ramp for the US 41 and I-43 Systems Interchange was analyzed separately in a Crash Analysis Report prepared by Strand Associates. Statewide average ramp crash rates are not available; therefore the results were instead compared to the statewide rural interstate average crash rates. The statewide average annual total crash rate is 62 crashes per HMVMT, and the statewide average injury and fatal crash rate is 18.9 crashes per HMVMT. As shown in Table 1-10 both the total crash rate and average injury and fatal crash rate exceeded the statewide average for all 4 ramps at this interchange. All crash data and statewide average crash rates, exclude accidents that involve deer.

**Table 1-10
US 41 / I-43 Ramp Crash Data (2005-2007)**

Roadway Segments	Segment Length (miles)	AADT (2006)	Total Crashes	Average Annual Total Crash Rate (HMVMT)	Average Injury and Fatal Crash Rate (HMVMT)
US 41 Southbound to I-43 Southbound Ramp	0.88	10,390	10	100	30.0
US 41 Northbound to I-43 Southbound Ramp	0.62	12,410	14	166	35.6
I-43 Northbound to US 41 Northbound Ramp	0.47	8,940	11	239	108.7
I-43 Northbound to US 41 Southbound Ramp	0.65	13,110	13	139	32.2

Note: Rates shown in bold are substandard

Source: Crash Analysis Data for ID 1133-10-00 Projects, Prepared by Strand Associates®, February 2010.

Summary: Safety concerns are an important consideration in developing proposed improvements that improve traffic weaving conditions between the Velp Avenue and I-43 interchanges, minimize speed differential on the freeway, and that separate regional and local traffic movements to the extent possible.

SECTION 2

Alternatives

Introduction

Section 2 describes the range of alternatives developed to address the key purpose and need factors identified in Section 1. Section 2 evaluates the alternatives, identifies reasonable alternatives retained for detailed study, and explains why other alternatives were eliminated from further consideration.

Subsection 2.4 discusses the Preferred Alternative selected by WisDOT and FHWA at the close of the public and agency comment period for the Draft EIS. Subsection 2.4 also includes updated information, including costs and impacts for the Preferred Alternative based on design refinements and other changes since the Draft EIS.

2.1 Description of Initial Range of Alternatives

2.1.1 Alternative A: No Build

The No Build Alternative would maintain the existing four-lane freeway and all of the interchanges as they are. There would be no capacity improvements to the US 41 mainline and no improvements would be made to the existing interchanges at Velp Avenue, I-43, or County M. No improvements to substandard bridge clearances or other deficiencies would be made. Over time, minimal improvements would be made that attempt to maintain current service levels, repair/rehabilitate existing structures, keep the driving surface in good condition, and address safety concerns at spot locations.

2.1.2 Build Alternatives

Build Alternatives B, C, D and E include a range of options for improving traffic capacity, traffic operations and safety on the US 41 freeway mainline and its interchanges. The main difference among the Build Alternatives occurs along the US 41 mainline between Velp Avenue and I-43 where various improvement levels are being considered, and at the US 41/I-43 System Interchange, where various interchange configurations are being considered.

Improvements that are common to all of the Build Alternatives include the following. These improvements are illustrated on Exhibits 2-3 through 2-6.

- Widen the US 41 freeway mainline, from Memorial Drive to County M, from 4 to 6 lanes and add auxiliary lanes along northbound and southbound US 41.
- Reconstruct the Velp Avenue interchange including roundabouts at the ramp terminals and at the Velp Avenue and Memorial Drive intersection. See 2.1.2(a) and 2.2.6 for more information on roundabout options in northwest quadrant of the Velp Avenue interchange. Reconstruct the County M interchange including roundabouts at the ramp terminals and at the County M/frontage road intersections.
- Construct new bridges over Velp Avenue, Canadian National (CN) Railroad, Wietor Drive, I-43, and Duck Creek.
- Replace the County EB/Lakeview Drive and County M bridges over US 41.
- Realign Beaver Dam Creek and replace the box culvert south of Velp Avenue interchange (see 2.1.2(b) for more information)
- Build storm water detention ponds along Velp Avenue and County EB/Lakeview Drive. Stormwater ponds will not be constructed within wetlands that would not otherwise be impacted by the US 41 improvements.

- Maintain the existing separation distance between the US 41 mainline and the frontage roads from I-43 to County M. While the existing separation distance does not meet minimum design standards (see Section 1), WisDOT determined that moving the frontage roads up to 35 feet farther away from the US 41 mainline to meet minimum standards would cause substantial impacts to wetlands and abutting development. Therefore, the existing separation distance will be maintained to minimize environmental impacts.

Subsections 2.1.2(a) and 2.1.2(b) focus on the roundabout options, common to all of the build alternatives for the southbound US 41 ramp terminal at Velp Avenue. Subsections 2.1.3 through 2.1.6 focus on the section of US 41 from Velp Avenue to I-43.

2.1.2(a) Roundabout Options in Northwest quadrant of US 141/Velp Avenue interchange

Two roundabout options as summarized below were considered in the northwest quadrant of the Velp Avenue interchange. An overview of the roundabout options is provided in Exhibit 2-1 (Page 2-22) and additional comparison information is provided in subsection 2.2.6.

Option A: Five-legged roundabout with new local access frontage road

- Requires roundabout with additional fifth leg connecting to new frontage road
- Provides connectivity to local road system at Memorial Drive
- Includes right-in, right-out only access to existing driveway in northwest quadrant near Beaver Dam Creek
- Requires lengthening of four structures over railroad

The two-lane frontage road associated with the five-legged roundabout would parallel the west side of US 41 from Velp Avenue to just south of the CN Railroad. The road would then follow along the south side of the railroad tracks in order to connect to the existing cul-de-sac at the northerly terminus of Memorial Drive on the east side of US 41.

Option B: Four-legged roundabout with right-in, right-out access

- Includes right-in, right-out only access to existing driveway in northwest quadrant near Beaver Dam Creek
- Does not provide connectivity to local road system at Memorial Drive
- Does not require lengthening of structures over railroad

2.1.2(b) Realignment of Beaver Dam Creek

Beaver Dam Creek, a tributary to Duck Creek, crosses US 41 just south of the Velp Avenue interchange. The existing creek follows the east side of US 41 and then has a sharp bend at the inlet and outlet of the box culvert that crosses US 41. Common to all of the build alternatives is to realign Beaver Dam Creek, as shown in Exhibit 2-2 (Page 2-23).

The realignment of Beaver Dam Creek is needed due to the US 41 mainline expansion and the Velp Avenue interchange reconfiguration. The relocated channel will cross US 41 approximately 400' to the south of its present location. The new alignment will facilitate a wider stream cross section with further separation from US 41. This will provide for better stream habitat, lessen the amount of retaining walls required, avoid impacts to nearby Lehner Park (Section 4f property) and allow for a better crossing angle at US 41. The structure length at the realigned box culvert crossing on US 41 is the same length that would have been needed if the structure were replaced at its present location.

This Beaver Dam Creek realignment is estimated to cost approximately \$200,000 to construct. The creek realignment would require approximately 3.8 new acres of right-of-way. It would also require 8 residential displacements in addition to those required for reconstruction of US 41 and the interchange ramps south of Velp Avenue (4 additional displacements on each side of US 41). Wetland impacts for the Beaver Dam Creek realignment would be approximately 1.3 acres along the east side of US 41. These impacts are included in each of the proposed build alternatives.

2.1.3 Alternative B: US 41 expansion with minor ramp improvements to I-43/US 41 interchange

An overview of Alternative B is provided in Exhibit 2-3 (Page 2-25). Key design features in addition to common improvements to all build alternatives include the following:

- Expand US 41 along its existing alignment from Velp Avenue to I-43.
- Extend the on and off ramps at the Velp Avenue interchange and realign them slightly to meet current design standards and accommodate roundabouts at the interchange ramp terminals.
- Construct an outside auxiliary lane along northbound and southbound US 41 between the Velp Avenue and I-43 interchanges to improve traffic weaving conditions.
- Make minor improvements to existing ramp geometry at the I-43/US 41 System Interchange to accommodate the wider US 41 mainline.
- Maintain access from Velp Avenue to I-43 via US 41 as it is today.

2.1.4 Alternative C: US 41 expansion with C/D roadways between US 141/Velp Avenue and I-43

An overview of Alternative C is provided in Exhibit 2-4 (Page 2-26). Key design features in addition to common improvements to all build alternatives include the following:

- Expand US 41 along its existing alignment from Velp Avenue to I-43.
- Construct Collector-Distributor (C/D) roads on both sides of US 41 between Velp Avenue and I-43. The C/D roads would accommodate traffic weaving movements rather than having those movements occur on the US 41 freeway mainline.
- Extend the on and off ramps at the Velp Avenue interchange and realign them slightly to meet current design standards and accommodate roundabouts at the interchange ramp terminals.
- Make minor improvements to existing indirect loop ramp geometry at the I-43/US 41 System Interchange to accommodate the wider US 41 mainline. Additional lighting along with enhanced signing and marking will be added to mitigate the tight loop ramps.
- Improve the semi-directional ramp from southbound US 41 to southbound I-43 to a 60 mph design speed, and the directional ramp from northbound I-43 to northbound US 41, to a 70 mph design speed.
- Maintain access from Velp Avenue to I-43 via US 41 as it is today.

2.1.5 Alternative D: US 41 expansion with C/D roadways between US 141/Velp Ave and I-43 with Freeway Split Configuration

An overview of Alternative D is provided in Exhibit 2-5 (Page 2-27). Key design features in addition to common improvements to all build alternatives include the following:

- Main difference between Alternative C and D is that under Alternative D, US 41 mainline would be reconstructed on a revised alignment that would allow for a freeway split for southbound US 41 to southbound I-43 within the existing interchange footprint.
- Construct Collector-Distributor (C/D) roads on both sides of US 41 between Velp Avenue and I-43. The C/D roads would accommodate traffic weaving movements rather than having those movements occur on the US 41 freeway mainline.

- Extend the on and off ramps at the Velp Avenue interchange and realign them slightly to meet current design standards and accommodate roundabouts at the interchange ramp terminals.
- Make minor improvements to existing indirect loop ramp geometry at the I-43/US 41 System Interchange to accommodate the wider US 41 mainline. Additional lighting along with enhanced signing and marking will be added to mitigate the tight loop ramps.
- Improve the semi-directional ramp from southbound US 41 to southbound I-43, and the directional ramp from northbound I-43 to northbound US 41, to a 70 mph design speed.
- Maintain access from Velp Avenue to I-43 via US 41 as it is today.

2.1.6 Alternative E: US 41 expansion with full reconfiguration of I-43/US 41 interchange

An overview of Alternative E is provided in Exhibit 2-6 (Page 2-28). Key design features in addition to common improvements to all build alternatives include the following:

- Expand US 41 including a revised northbound alignment, and a raised northbound gradeline, to accommodate the southbound US 41 to southbound I-43 ramp within the existing interchange footprint and the northbound I-43 to southbound US 41 flyover ramp piers and foundations.
- Reconstruct I-43/US 41 System Interchange with direct ramps (all loop ramps eliminated)
- In order to accommodate the FHWA recommended design speed for the direct ramps at the US 41/I-43 interchange, eliminate existing access between Velp Avenue and I-43 via US 41; Atkinson Avenue or an alternate route would be used to access southbound I-43 from Velp Avenue or to access Velp Avenue from northbound I-43.

2.2 Alternatives Evaluation and Screening

This subsection evaluates the alternatives described in subsection 2.1 in terms of the following criteria as applicable. The alternatives retained for detailed study are also identified.

Ability to address key purpose and need factors

Detailed information on purpose and need is provided in EIS Section 1. Key purpose and need factors considered in this alternatives evaluation are listed below. A comparison among the alternatives for these factors is provided in Figure 2-1.

- System linkage and route importance
- Traffic and truck volumes
- Traffic operations
- Geometric deficiencies
- Safety

Environmental Impacts

Detailed information on environmental impacts is provided in EIS Section 3. Key impacts considered in this alternatives evaluation include construction cost, new right-of-way acquisition, residential and business displacements, stream crossings, wetlands, and public use land acquisition as applicable.

Input from Local Officials and the Public

Views of local officials and the public are based on the local officials meeting and a public information meeting held on March 3, 2010 and the public information meeting held on August 18, 2010 at which versions of the alternatives described in subsection 2.1 were presented. In addition, there were two public informational meetings for this project prior to the determination that an EIS would be prepared. One public informational meeting was held on March 27, 2007, to inform the public of the proposed project, along with a range of alternatives for Wietor Wharf Park access. A second public informational meeting was held on November 27, 2007 to give the public an update on the proposed project design, along with introducing roundabouts at the Velp Avenue interchange. Local officials' meetings were held

in advance of each public information meeting to obtain input on project design features and other aspects in preparation for the public information meetings.

Interchange Access Justification Report

As discussed in EIS Section 1, US 41 is planned for future conversion to an Interstate Highway and I-43 is an existing Interstate Highway. Design standards for the Interstate System including any changes in access are governed by the Federal Highway Administration (FHWA) in accordance with 23 CFR Part 625, *Design Standards for Highways*. Under its policy guidance, FHWA evaluates requests for additional and revised access to the Interstate System. The intent is to protect the operation, safety and capacity of the Interstate System.

Proposed changes to the Interstate System are documented through an *Interchange Access Justification Report* (IAJR) that is reviewed and approved by FHWA. The IAJR for the US 41 corridor in Brown County was prepared by WisDOT and submitted to FHWA in March 2010.

FHWA reviewed the build alternatives presented in the IAJR to determine their compatibility with future conversion of US 41 to an Interstate Highway. FHWA provided its findings on June 21, 2010, agreeing that Alternative B be dropped from further consideration, and recommending that Alternatives C, D, and E be retained for further development and consideration in the project's EIS phase. The following recommendations were made for Alternatives C and D:

- The southbound US 41 to southbound I-43 directional ramp should be designed to provide a minimum design speed of 50-60 mph.
- The northbound I-43 to northbound US 41 directional ramp should be designed to provide a minimum design speed of 50-60 mph.
- The design speed for the existing loop ramps meets minimum design standards, however a higher design speed is desirable, because these ramps are part of the US 41/I-43 system interchange.

2.2.1 Alternative A: No Build

The No Build Alternative would not be compatible with system linkage and route importance. US 41 is designated as a backbone highway under *Connections 2030* and as a National Highway System route. US 41 and I-43 are designated long truck routes allowing trucks up to 65 feet in length to use these highways. The US 41/I-43 interchange is a major System Interchange (freeway to freeway interchange).

The No Build Alternative would not provide additional freeway mainline capacity, which is needed to accommodate design year (2035) traffic volumes and high truck volumes that comprise approximately 10.9% of the AADT on US 41 and I-43.

The No Build Alternative would not provide an acceptable operational Level of Service (LOS) in design year 2035. Backbone highways require a minimum of LOS C. Without improvements, southbound US 41 south of the Velp Avenue interchange will operate at LOS E in the AM peak and northbound US 41 at the I-43 interchange will operate at LOS F in the PM peak. Westbound I-43 east of Military Avenue will operate at LOS F in the PM peak.

The No Build Alternative would not address existing geometric deficiencies. Existing deficiencies include insufficient capacity/substandard roadway geometry, grade separation structures with substandard vertical clearance, interchange on and off ramps that are too short, tight loop ramps at the I-43 interchange that have an undesirable design speed less than 50% of the freeway mainline design speed, insufficient traffic weaving distance on US 41 from Velp Avenue to I-43, and insufficient distance between interchange ramps and cross roads.

The No Build Alternative would not address the high crash rate on US 41 from Velp Avenue to I-43, which exceeds the statewide average crash rate for similar freeways. It would also fail to address the high ramp crash rates at the I-43 interchange where the total rates and injury/fatal crash rates are well above the

statewide average ramp crash rates. Safety concerns due to insufficient traffic weaving distances on northbound and southbound US 41 from Velp Avenue to I-43 would not be addressed.

Further, the No Build Alternative would be incompatible with the regional and local plans that include the US 41 expansion project. The plans include the *Green Bay Metropolitan Planning Organization Long-Range Transportation Plan* completed in November 2005 and amended in 2007, and the *Brown County Comprehensive Plan* completed by the Brown County Planning Commission in October 2004.

Because the No Build Alternative does not address the project's key purpose and need factors, it is not a viable alternative and has been eliminated from further consideration. The No Build Alternative serves as a baseline for comparison to the Build Alternatives.

2.2.2 Alternative B: US 41 expansion with minor ramp improvements to I-43/US 41 interchange (Eliminated from further consideration)

Proposed improvements under Alternative B would not be compatible with system linkage and route importance as it does not meet FHWA expectations for future interstate conversion.

The US 41 traffic operation analysis indicates that Alternative B would improve traffic operations when compared to the No Build Alternative. Specifically, the traffic operations analysis indicates the following for the design year 2035:

- Traffic operations in the AM and PM peak hours would be at LOS C or better and no freeway segments would have operations at LOS F.
- Segments that would have operations at LOS D or E include the following:
 - US 41 southbound roadway north of County M (LOS D in AM peak hour)
 - US 41 northbound roadway north of County M (LOS D in PM peak hour)
 - US 41 northbound merge segment at County M (LOS D in PM peak hour)
 - I-43 northbound merge and mainline segments from Atkinson Avenue to US 41 (LOS D in PM peak hour)
 - I-43 northbound diverge segment from Atkinson Avenue to US 41 (LOS E in PM peak hour)

Alternative B includes adding an auxiliary lane to the weaving sections on US 41 between Velp Avenue and I-43. This improves freeway operations of the northbound weave to LOS C in the PM peak hour compared to LOS F for the No Build Alternative.

Alternative B does not fully address geometric deficiencies or safety concerns on US 41. It would not improve the tight loop ramps at the I-43 interchange. The speed differential between the freeway mainline and the loop ramps is less than desirable which increases the potential for vehicles to run off the road if speed isn't sufficiently reduced to negotiate the controlling loop ramp radius. The loop ramps have a substandard superelevation (banking of the curved roadway so it can be safely maneuvered at reasonable speeds). The loop ramps also have substandard shoulder widths.

Extending and realigning the Velp Avenue interchange ramps would reduce the traffic weaving distance on US 41 between this interchange and the I-43 interchange. The northbound weaving distance would be reduced by approximately 150 feet and the southbound weaving distance by about 90 feet. The crash rates for the traffic weaving sections are above the statewide average crash rate. Therefore, reducing the weaving distance would likely increase the potential for crashes along these weaving segments.

The speed differential between the median lane and the outside lane of the US 41 northbound traffic weaving section ranges between 24 and 35 mph in the 2035 PM peak hour. For the US 41 southbound weave, the speed differential ranges between 13 and 30 mph in the 2035 AM peak hour. With vehicles travelling at different speeds in a substandard weaving section it is anticipated to increase the amount of accidents between Velp Avenue and I-43 interchange.

Alternative B would retain existing access between Velp Avenue and I-43 via US 41.

Alternative B is estimated to be the least expensive to construct (\$155 million). It would require approximately 13 new acres of right-of-way, 13 residential displacements and one business displacement. Two stream crossings are required (Beaver Dam Creek and Duck Creek). Wetland impacts would be approximately 43 acres.

Section 4(f) property impacts would total approximately 0.55 acres. The impacts would include 0.15 acres from the Gordon Nauman Conservation Area, and 0.4 acres from the Green Bay West Shores Wildlife Area (Peats Lake Unit) owned by DNR. Section 6(f) property impacts would total approximately 0.4 acres from the Green Bay West Shores Wildlife Area (Peats Lake Unit).

Input from local officials and the public at the March 3, 2010 meeting indicated general support for Alternative B because it would maintain existing access between Velp Avenue and I-43, similar to Alternative C. However, there were safety concerns with Alternative B because it would not address traffic weaving and would retain the tight loop ramps at the I-43 interchange. In addition, there were concerns from local officials that Alternative B would not be compatible with future conversion of US 41 to an Interstate Highway.

This alternative has been eliminated from further consideration as a reasonable build alternative because it does not address the operational and safety issues resulting from the short weaving section along the US 41 mainline. The IAJR dated March 25, 2010 includes a statement that Alternative B no longer be included as an alternative for further study.

2.2.3 Alternative C: US 41 expansion with C/D roadways between US 141/Velp Avenue and I-43 (Eliminated from further consideration)

Proposed improvements under Alternative C would be compatible with system linkage and route importance and would provide additional capacity on US 41, which is needed to accommodate design year (2035) traffic volumes.

Alternative C does not fully address geometric deficiencies on US 41. This alternative would not eliminate the tight loop ramps at the I-43 interchange, and would have all of the same geometric-associated safety concerns about the tight loop ramps as Alternative B, except that the ramp entry and exit points are separated from mainline US 41.

The US 41 traffic operation analysis indicates that Alternative C would improve traffic operations compared to the No Build Alternative or Alternative B. Specifically, the traffic operations analysis indicates the following for the design year 2035:

- Traffic operations in the AM and PM peak hours would be at LOS C or better and no freeway segments would have operations at LOS E or LOS F.
- The following segments would experience congestion at LOS D:
 - US 41 southbound roadway at County M and north of County M (AM peak hour)
 - US 41 northbound roadway at County M and north of County M (PM peak hour)
 - US 41 northbound merge segment at County M (PM peak hour)
 - I-43 northbound mainline and diverge segments between Atkinson Avenue and US 41 (PM peak hour)

The addition of C/D roadways under Alternative C improves safety and traffic operations by removing traffic weaving movements from the US 41 freeway mainline, compared to the No Build Alternative or Alternative B. A C/D (collector/distributor) roadway is a one-way road next to a freeway that is used for some or all of the ramps that would otherwise merge directly into or split from the main lanes of the freeway. The weaving between exiting and entering vehicles from both the Velp Avenue interchange and the I-43 interchange would occur on a two lane C/D roadway, prior to merging onto the US 41 mainline. With lower speeds and traffic volumes on the C/D roadways, it is reasonable to assume that there would be fewer and less severe crashes. Weaving segments on the C/D roadways would operate at LOS C or better in the AM and PM peak hours.

The speed differential between the median lane and the outside lane of the northbound C/D road ranges between 5 and 21 mph in the PM peak hour and the speed differential for the southbound C/D roadway ranges between 15 and 26 mph in the AM peak hour. These speed differentials are less than the speed differentials that would occur with Alternative B where traffic weaving takes place on the US 41 mainline.

Alternative C would retain existing access between Velp Avenue and I-43 via US 41.

Alternative C is estimated to cost about \$205 million to construct. It would require approximately 30 new acres of right-of-way, 13 residential displacements and one business displacement. Three stream crossings would be required (one for Beaver Dam Creek and two crossing locations for Duck Creek). Wetland impacts for Alternative C would be approximately 51 acres.

Section 4(f) property impacts would total approximately 12.15 acres. The impacts would include 0.55 acres from the Gordon Nauman Conservation Area, and 11.6 acres from the Green Bay West Shores Wildlife Area (Peats Lake Unit). Section 6(f) property impacts would total approximately 5.5 acres from the Green Bay West Shores Wildlife Area (Peats Lake Unit). In addition, there would be minor impacts to the park enhancements (boardwalks) at Wietor Wharf Park and Deerfield Docks for which Dingell-Johnson funds were used, and which would require compensation similar to Land and Water Conservation Fund (LWCF) Section 6(f) impacts.

Input from local officials and the public at the March 3, 2010 and August 18, 2010 meetings indicated general support for Alternative C because it would maintain existing access between Velp Avenue and I-43. There was further support for Alternative C because it would be compatible with future conversion of US 41 to an Interstate Highway. There were safety concerns with Alternative C because it would retain the tight loop ramps at the I-43 interchange.

Based on the IAJR, FHWA requested that the directional ramp at the I-43 interchange (NB I-43 to NB US 41 ramp) and the semi-directional ramp at the I-43 interchange (SB US 41 to SB I-43 ramp) be designed to a minimum 50-60 mph design speed. FHWA also noted that while the loop ramps at the I-43 interchange meet minimum design standards, a higher design speed is desirable for the US 41/I-43 System Interchange.

WisDOT and FHWA have agreed that Alternative C and Alternative D provide essentially the same function pertaining to traffic operations, safety and access. However, Alternative D provides this function within a smaller environmental footprint, including fewer impacts to public use lands and does not create fragmentation of high quality wetlands. Therefore, Alternative C has been eliminated from further consideration as a build alternative.

2.2.4 Alternative D: US 41 expansion with C/D roadways between US 141/Velp Ave and I-43 with Freeway Split Configuration

Proposed improvements under Alternative D would be compatible with system linkage and route importance and would provide additional capacity on US 41, which is needed to accommodate design year (2035) traffic volumes.

Alternative D does not fully address geometric deficiencies on US 41. This alternative would not eliminate the tight loop ramps at the I-43 interchange, and would have all of the same geometric-associated safety concerns about the tight loop ramps as Alternative B, except that the ramp entry and exit points are separated from mainline US 41.

Freeway operations, and the lane speed differentials, for Alternative D would be the same as those under Alternative C. The main difference between these alternatives is that the US 41 mainline would be constructed on a revised alignment that would allow for a freeway split for southbound US 41 to southbound I-43, which would reduce the amount of impacts west of US 41 compared to Alternative C. This revised alignment would involve raising the grade of southbound US 41 mainline considerably from just north of the CN Railroad to north of Duck Creek to allow for the construction of a bridge for the southbound US 41 ramp to southbound I-43 ramp over the northbound US 41 mainline.

Similar to Alternative C, the C/D roadways would improve safety compared to the No Build Alternative or Alternative B. With lower speeds and traffic volumes on the C/D roadways, it is reasonable to assume that there would be fewer and less severe crashes.

Alternative D would retain existing access between Velp Avenue and I-43 via US 41.

Alternative D is estimated to cost about \$220 million to construct. It would require approximately 29 new acres of right-of-way, 13 residential displacements and one business displacement. Two stream crossings would be required (Beaver Dam Creek and Duck Creek with a minor channel realignment of Beaver Dam Creek). Wetland impacts for Alternative D would be approximately 57 acres.

Section 4(f) property impacts would total approximately 7.05 acres. The impacts would include 0.55 acres from the Gordon Nauman Conservation Area, and 6.5 acres from the Green Bay West Shores Wildlife Area (Peats Lake Unit). Section 6(f) property impacts would total approximately 6.5 acres from the Green Bay West Shores Wildlife Area (Peats Lake Unit). In addition, there would be minor impacts to the park enhancements (boardwalks) at Wietor Wharf Park and Deerfield Docks for which Dingell-Johnson funds were used, and which would require compensation similar to LWCF Section 6(f) impacts.

Input from local officials and the public at the March 3, 2010 and August 18, 2010 meetings indicated general support for Alternative D because it would maintain existing access between Velp Avenue and I-43. There was further support for Alternative D because it would be compatible with future conversion of US 41 to an Interstate Highway. There were safety concerns with Alternative D because it would retain the tight loop ramps at the I-43 interchange.

Based on the IAJR, FHWA requested that the directional ramp at the I-43 interchange (NB I-43 to NB US 41 ramp) and the semi-directional ramp at the I-43 interchange (SB US 41 to SB I-43 ramp) be designed to a minimum 50-60 mph design speed. FHWA also noted that while the loop ramps at the I-43 interchange meet minimum design standards, a higher design speed is desirable for the US 41/I-43 System Interchange. FHWA recommended that Alternative D be retained for further development and consideration in the project's EIS phase.

2.2.5 Alternative E: US 41 expansion with full reconfiguration of I-43/US 41 interchange

Proposed improvements under Alternative E would be compatible with system linkage and route importance and would provide additional capacity on US 41, which is needed to accommodate design year (2035) traffic volumes. Eliminating the tight loop ramps at the I-43 interchange would be desirable for a System Interchange.

The US 41 traffic operation analysis indicates that Alternative E would improve traffic operations compared to the No Build Alternative and other build Alternatives. Specifically, the traffic operations analysis indicates the following for the design year 2035:

- Traffic operations in the AM and PM peak hours would be at LOS C or better and no freeway segments would have operations at LOS E or LOS F.
- The following segments would experience congestion at LOS D:
 - US 41 southbound roadway at County M and north of County M (AM peak hour)
 - US 41 northbound roadway at County M and north of County M (PM peak hour)
 - US 41 northbound merge segment at County M (PM peak hour)

Alternative E is the only alternative that offers high-speed direct ramps to replace the existing tight loop ramps at the US 41/I-43 interchange. The high-speed direct ramps at the US 41/I-43 System Interchange provide free-flow movements for regional traffic. In addition, the high-speed direct ramps would address the safety concerns described previously for Alternatives B, C, and D, associated with tight loop ramps and weaving.

Alternative E would remove existing access between Velp Avenue and I-43 via US 41. Removal of the northbound Velp Avenue to southbound I-43 connection and the northbound I-43 to southbound Velp Avenue connection is expected to reduce the amount of traffic on I-43 between Atkinson Avenue and US 41. However, it will increase the amount of traffic along Velp Avenue from Atkinson Drive to US 41, by approximately 500 vehicles in the 2035 AM peak hour and 1,100 vehicles in the 2035 PM peak hour.

Alternative E is estimated to cost about \$230 million to construct. It would require approximately 37 new acres of right-of-way, 13 residential displacements and one business displacement. Two stream crossings would be required (Beaver Dam Creek and Duck Creek). Wetland impacts for Alternative E would approximately 55 acres.

Section 4(f) property impacts would total approximately 11.7 acres. The impacts would include 1.1 acres from the Gordon Nauman Conservation Area, and 10.6 acres from the Green Bay West Shores Wildlife Area (Peats Lake Unit). Section 6(f) property impacts would total approximately 10.6 acres from the Green Bay West Shores Wildlife Area (Peats Lake Unit). There would be no impacts to the boardwalks at Wietor Wharf Park or Deerfield Docks.

Input from local officials and the public at the March 3, 2010 and August 18, 2010 meetings indicated general support for Alternative E because it would address long-term traffic mobility and safety concerns. In addition, Alternative E was supported because it would be compatible with future conversion of US 41 to an Interstate Highway. The main opposition to Alternative E was that it would eliminate existing access between Velp Avenue and I-43 via US 41. Some people asked whether Alternative E could be refined to include this access, but further analysis indicated this access cannot be accommodated because of the grade differential between Velp Avenue and the ramps for US 41 northbound to I-43 southbound and I-43 northbound to US 41 southbound.

Based on the IAJR, FHWA recommended that Alternative E be retained for further development and consideration in the project's EIS phase. There were no concerns with the proposed design of this alternative relative to future conversion of US 41 to an Interstate Highway.

2.2.6 Comparison of Roundabout Options in Northwest Quadrant of US 141/Velp Avenue Interchange

The local community (Village of Howard) has informed WisDOT of the potential for commercial development in the northwest quadrant of the Velp Avenue Interchange, which is zoned "Highway Commercial". Therefore, as part of this project, WisDOT has evaluated two different options for the southbound ramp terminal at this interchange, which is adjacent to/serves this area, and is common to all of the build alternatives. One option would be a standard 4-leg roundabout with no new/additional frontage road, and the other option would be a 5-leg roundabout with a new frontage road paralleling US 41 and serving this area zoned "Highway Commercial". See Exhibit 2-1 (Page 2-22) for a plan view of these two options and the discussion below for additional detail.

Option 1: 4-leg roundabout without new frontage road

This option would involve a standard 4-leg roundabout at the southbound ramp terminal, and would not include a new frontage road servicing the area zoned "Highway Commercial". Access to this area would be maintained at the existing driveway location along Velp Avenue. However, this access would be restricted to "right-in, right-out" only due to the proposed extension of the median/splitter island further west on Velp Avenue. Despite the restricted access, traffic analysis shows that the 4-leg roundabout would provide good traffic operations with relatively low queues and delays for the design year traffic forecast (AM Peak Hour LOS B, and PM Peak Hour LOS B).

Option 2: 5-leg roundabout with new frontage road

This option would involve a 5-leg roundabout at the southbound ramp terminal, along with a new frontage road as the 5th leg, paralleling the west side US 41, servicing the area zoned “Highway Commercial” in the northwest quadrant of the interchange, and turning to the east to go under US 41 and connect to Memorial Drive on the east side of US 41. FHWA requires that the 5th leg of the roundabout (the new frontage road) provide local connectivity rather than dead-ending, hence the proposed connection to Memorial Drive. This option would provide additional access to the “Highway Commercial” area via driveways off the new frontage road, along with the connection to Memorial Drive. As with the 4-leg roundabout option, the existing driveway/access along Velp Avenue would be restricted to “right-in, right-out only” due to the proposed extension of the splitter island on Velp Avenue further west. The 5-leg option would provide good traffic operations and additional access/traffic movements to and from this area. Requirements/needs of the 5 leg option above and beyond the 4-leg option include approximately 2.9 acres of new right-of-way, 1.1 acres of wetland, and \$2.3 million construction cost. Construction of this option would require local cost share. Recent feedback from the Village of Howard indicates that they are not in favor of this option due to factors such as cost, impact to developable land, and incompatibility with potential future development in the Memorial Drive area.

The 5-leg roundabout was presented at the March 2, 2011 public hearing as a possible design option for Alternatives D and E. This design option has now been eliminated from further consideration. See subsection 2.4.2 for more information.

**Figure 2-1
Alternatives Comparison to Key Purpose and Need Factors**

Purpose & Need Factors	Alternative A ¹ No Build (ELIMINATED FROM FURTHER STUDY)	Alternative B ² US 41 expansion with minor ramp improvements to I-43/US 41 interchange (ELIMINATED FROM FURTHER STUDY) ³	Alternative C ² US 41 expansion with C/D roadways between Velp Avenue and I-43 (ELIMINATED FROM FURTHER STUDY) ⁴	Alternative D ² US 41 expansion with C/D roadways between Velp Avenue and I-43 and compatibility of I-43/US 41 interchange to full reconfiguration	Alternative E ² US 41 expansion with full reconfiguration of I-43/US 41 interchange
System Linkage/Route Importance <ul style="list-style-type: none"> Backbone Highway (US 41) NHS route (US 41) Long truck route (US 41 and I-43) US 41/I-43 = Systems Interchange (freeway to freeway interchange) Future conversion to Interstate Highway (US 41) 	Not addressed	Minor improvements to US 41/I-43 Systems Interchange Not compatible for future Interstate conversion	Improvements to US 41/I-43 Systems Interchange Compatible for future Interstate conversion	Improvements to US 41/I-43 Systems Interchange Compatible for future Interstate conversion	High speed ramps at US 41/I-43 interchange provide free-flow movements for regional traffic Compatible for future interstate conversion
Traffic Volumes (Design Year 2035) (60,000 AADT threshold for 4-lane backbone highways) <ul style="list-style-type: none"> US 41: 80,500 – 97,700 AADT I-43: 55,700 AADT 	Not addressed	Proposed 6-lane US 41 freeway mainline meets design standard	Proposed 6-lane US 41 freeway mainline meets design standard	Proposed 6-lane US 41 freeway mainline meets design standard	Proposed 6-lane US 41 freeway mainline meets design standard
Truck Volumes (Design Year 2035) (High truck volumes contribute to congestion) <ul style="list-style-type: none"> US 41: 10.3% of AADT I-43: 11% of AADT US 141/Velp Avenue: 5.7% of AADT 	Not addressed	Tight loop ramps at I-43 interchange undesirable for high truck volumes Additional US 41 mainline capacity benefits truck traffic	Tight loop ramps at I-43 interchange undesirable for high truck volumes Additional US 41 mainline capacity benefits truck traffic	Tight loop ramps at I-43 interchange undesirable for high truck volumes Additional US 41 mainline capacity benefits truck traffic	High speed ramps at US 41/I-43 interchange provide maximum benefits for truck traffic Additional US 41 mainline capacity benefits truck traffic
Traffic Operations (LOS C required for backbone highways) <ul style="list-style-type: none"> SB US 41 south of US 141/Velp Avenue = LOS E in AM peak SB US 41 from US 141/Velp Avenue to County M = LOS D in AM peak NB US 41 from Mason St. to County M = LOS F in PM peak NB I-43 south of US 41 = LOS F in PM peak 	Not addressed	Some operations below LOS C	Operations at LOS C or better	Operations at LOS C or better	Operations at LOS C or better
Geometric Deficiencies <ul style="list-style-type: none"> Insufficient capacity/substandard roadway geometry Grade separation structures have substandard vertical clearance Interchange on and off ramps too short Tight loop ramps at I-43 interchange have design speed less than 50% of freeway mainline design speed ⁵ Insufficient traffic weaving distance (US 41 from US 141/Velp to I-43) Insufficient distance between interchange ramps and cross roads Insufficient frontage road separation (US 41 from I-43 to County M) 	Not addressed	Does not improve tight loop ramps at I-43 interchange Does not address insufficient weaving distance between US 141/Velp Avenue and I-43 Does not address insufficient frontage road separation between I-43 and County M along northbound US 41 Other geometric deficiencies addressed	Does not improve design speeds for tight loop ramps at I-43 interchange Improves design speed for ramp from southbound US 41 to southbound I-43 to 60 mph and from northbound I-43 to northbound US 41 to 70 mph C/D roads remove weaving movements from US 41 mainline and provide minimum recommended 1600 ft. weaving distance Does not address insufficient frontage road separation between I-43 and County M along northbound US 41 Provides desirable 800 ft. spacing between northbound US 41 merge points for the CD road and northbound I-43 Other geometric deficiencies addressed	Does not improve design speeds for tight loop ramps at I-43 interchange Improves design speed for ramps from southbound US 41 to southbound I-43 and from northbound I-43 to northbound US 41 to 70 mph C/D roads remove weaving movements from US 41 mainline and provide minimum recommended 1600 ft. weaving distance Does not address insufficient frontage road separation between I-43 and County M along northbound US 41 Provides desirable 800 ft. spacing between northbound US 41 merge points for the CD road and northbound I-43 Other geometric deficiencies addressed	High speed ramps replace existing tight loop ramps at US 41/I-43 interchange Does not address insufficient frontage road separation between I-43 and County M along northbound US 41 Other geometric deficiencies addressed
Access Access between US 141/Velp Ave. and I-43 via US 41	Provided	Provided	Provided	Provided	Eliminated
Safety (Statewide crash rate comparison = 83.7 crashes per HMVMT) <ul style="list-style-type: none"> NB US 41 from US 141/Velp Ave. to I-43 = 101.4 per HMVMT SB US 41 from I-43 to US 141/Velp Ave. = 169.7 per HMVMT 	Not addressed	Does not separate out mainline traffic for NB and SB US 41 weaving sections between US 141/Velp Ave. and I-43. Otherwise, improves safety	Improves safety	Improves safety	Improves safety

- NOTES:**
- The No Build Alternative does not address the project's key purpose and need factors and therefore is not a viable course of action. It serves as a baseline of comparison to the build alternatives.
 - Proposed improvements common to all of the Build Alternatives include the following:
 - Widen the US 41 freeway mainline from 4 to 6 lanes and add auxiliary lanes along northbound and southbound US 41.
 - Reconstruct the US 141/Velp Avenue interchange including roundabouts at the ramp terminals and at the US 141 (Velp Avenue)/Memorial Drive intersection.
 - Reconstruct the County M interchange including roundabouts at the ramp terminals and at the County M/frontage road intersections.
 - Construct new bridges over US 141/Velp Avenue, Canadian National (CN) Railroad, I-43, Wietor Drive, and Duck Creek.
 - Replace the County EB/Lakeview Drive and County M bridges over US 41.
 - Construct a new frontage road with a five-legged roundabout at the US 141/Velp Avenue interchange ramp terminal west of US 41
 - Realign Beaver Dam Creek and replace the box culvert south of US 141/Velp Avenue interchange.
 - Build stormwater detention ponds along US 141/Velp Avenue and County EB/Lakeview Drive.
 - Maintain the existing separation distance between the US 41 mainline and the frontage roads from I-43 to County M
 - Alternative B has been eliminated from further consideration as a reasonable build alternative because it does not address the operational and safety issues resulting from the short weaving section along the US 41 mainline.
 - Alternative C has been eliminated from further consideration as a reasonable build alternative because of the substantial impacts to Section 4(f) resources compared to Alternatives D and E that address project purpose and need. In addition, Alternative C would impact and fragment higher quality wetlands compared to Alternatives D and E due to the southbound US 41 to southbound I-43 flyover ramp.
 - Per WisDOT FDM Chapter 11-30-1, the ramp design speed for freeway to freeway interchanges should be in the upper range or 85% of the freeway mainline design speed (within 10 mph of the mainline design speed).

2.3 Other Alternatives Considered

2.3.1 Improvements without Additional Capacity on US 41

WisDOT considered a lower level of improvements that would include the addition of collector/distributor (C/D) roads or auxiliary lanes to help with the existing weaving problem between the Velp Avenue interchange and I-43, without adding additional lanes to US 41 mainline. Included in this alternative, would be reconstruction of the Velp Avenue interchange, the County M interchange, and minor ramp modifications to the US 41/I-43 interchange to match the new C/D roadways or auxiliary lanes.

The addition of auxiliary lanes or a C/D roadway to the weaving sections on US 41 between Velp Avenue and I-43 would improve the freeway operations and safety at that location. However, this alternative would not address the need for additional capacity on US 41 to accommodate design year (2035) traffic volumes. Similar to traffic operations under the No Build alternative, with this alternative there would be several segments of US 41 and I-43 that would operate at LOS F. In addition, the projected speeds in the PM peak hour on each of the failing freeway segments would be less than 20 miles per hour.

WisDOT and FHWA have eliminated this alternative from further consideration because it fails to meet the project purpose and need.

2.3.2 US 41 Expansion with the US 141/Velp Avenue Interchange Removed

This alternative involved expansion of US 41 mainline facilities from four lanes to six lanes within its existing alignment and included removing the Velp Avenue Interchange access to US 41, with no changes to the US 41/I-43 System Interchange ramps. See Figure 2-2.

Removal of the Velp Avenue interchange was evaluated because the existing close spacing between the Velp Avenue interchange and the US 41/I-43 interchange does not meet current design standards and is not desirable for a future Interstate facility. There are also safety concerns due to traffic weaving movements between the interchanges.

Figure 2-2: US 41/Velp Ave Interchange Removed



Source: US 41 EIS Traffic Operations Modeling Draft Report. Strand Associates®, January 2010.

According to the US 41 Traffic Operations Report prepared for WisDOT by Strand Associates in 2010, removal of the US 41 and Velp Avenue interchange would cause substantial traffic diversion to the US 41/WIS 29 interchange and the I-43/Atkinson Avenue interchange. Intersection operations would be adversely affected by the additional traffic in design year 2035. Freeway operations south of WIS 29 would also be adversely affected due to the heavy delays experienced at the northbound US 41 and WIS 29 ramp terminal intersection. Removal of the Velp Avenue interchange would also likely result in substantial local impacts such as:

- Loss of business along Velp Avenue
- Longer trips for roadway users
- Delayed response time for emergency vehicles
- Longer snow removal routes (Velp Avenue is the primary access point for Brown County)
- Loss of I-43 as an alternative route for traffic incident management

WisDOT and FHWA have determined that this alternative be eliminated from further consideration based on the traffic operations analysis, and substantial impacts to regional and local traffic mobility/travel patterns that would occur if this existing freeway access is removed.

2.3.3 Transportation System Management

Transportation System Management (TSM) is the application of low cost improvements that maximize the efficiency of the existing highway system while minimizing social and environmental impacts. The US 41 Project scope includes Intelligent Transportation System (ITS) elements should the need for ITS applications become identified. The design team has specifically considered the use of ramp metering, ramp gates, High Occupancy Vehicle (HOV) lanes or High Occupancy Toll (HOT) lanes, permanent ITS cameras and variable messages boards along the corridor. The use of permanent cameras and dynamic signs will assist the driving public with the status of roadway conditions and will be implemented to assist with roadway efficiencies.

Specific TSM measures under consideration include the following:

- A 14-16.75 foot inside shoulder that could be a future HOV or HOT lane.
- Interchange ramp slopes, acceleration distances and right-of-way will be designed and provided to accommodate future ramp metering that could be implemented in the future if needed without additional impacts to the surrounding properties.
- Ramp gates will be provided to allow emergency responders to quickly close ramps in the event of an incident on the freeway.
- Permanent ITS cameras and changeable message boards will be used at various locations along the corridor to monitor and provide information on traffic conditions and incidents.

Incorporating TSM measures into the project will help improve traffic operations and safety to some extent, but would not address system linkage and route importance, traffic demand, geometric deficiencies or safety concerns discussed in EIS Section 1. Therefore, the TSM alternative is not a viable stand-alone alternative for meeting project purpose and need.

2.3.4 Transportation Demand Management

Transportation Demand Management (TDM) strives to reduce the number of automobile trips through increased transit ridership and other strategies such as use of carpooling and park-ride lots. In the Green Bay metropolitan area, bus transit is used to the extent available and some employers are able to offer flexible hours to reduce peak hour traffic.

WisDOT maintains a statewide RIDESHARE program to encourage commuters to use carpooling and to encourage employers to provide commuting incentives. The program includes on line registration for matching carpool and bicycle commuters. Information on park-ride facilities is also provided and many of the state's park-ride facilities have overnight parking, bike racks, telephones and shelters. Employers are encouraged to provide carpool incentives, participate in employee commuter tax benefits and provide flexible work hours. There are several existing park-ride lots in the US 41 corridor and WisDOT is proposing additional lots at locations with the highest use potential, including the County M interchange.

TDM measures have limited potential to alleviate traffic congestion in the US 41 corridor, but would provide alternative travel options. TDM measures would not address system linkage and route importance, traffic demand, geometric deficiencies or safety concerns discussed in EIS Section 1. Therefore, the TDM alternative is not a viable stand-alone alternative for meeting project purpose and need.

2.3.5 Other Transportation Modes

Mass Transit

The City of Green Bay has bus service but not along the US 41 corridor. Greyhound and Jefferson bus lines provide inter-city bus service in the region.

Passenger Rail Service

There is no passenger rail service at this time within the Green Bay metropolitan area. The *Midwest Regional Rail Initiative Report* indicates that rail service for the Green Bay area may be available by 2017 at the very earliest as a part of the Chicago-Milwaukee-St. Paul/Green Bay route.

Pedestrian and Bicycle Connections

WisDOT's design guidelines for the US 41 corridor include providing accommodations for pedestrians and bicyclists at freeway underpass and overpass locations where practicable. WisDOT and the Village of Howard are discussing conceptual plans for providing bicycle and pedestrian accommodations at locations such as the Duck Creek crossings.

The US 41 project provides opportunities for enhancing multi-modal transportation and WisDOT is committed to including project design features that enhance transit, pedestrian and bicycle travel where possible and practicable. While a substantial increase in bus, rail, pedestrian and bicycle travel would potentially reduce the number of auto trips in the US 41 corridor, this reduction would not address the need for additional capacity on US 41, existing highway deficiencies, or safety concerns. Therefore other transportation modes are not a viable stand-alone solution for addressing project purpose and need.

2.4 Selection of Preferred Alternative

Build Alternatives D and E remained under consideration through the public hearing held on March 2, 2011. After reviewing public and agency input received during the public hearing and Draft EIS comment period that ended on March 28, 2011, WisDOT and FHWA have identified Alternative E, with design refinements as discussed in subsection 2.4.2, as the preferred alternative.

The current improvement concepts for Alternative E are shown in Exhibit 2-7 (Page 2-29). Updated impacts for Alternative E are discussed in section 3.

2.4.1 Summary of Preferred Alternative E

Alternative E has the following design features that were common to all of the Build Alternatives considered in the Draft EIS:

- Widen the US 41 freeway mainline from 4 to 6 lanes and add auxiliary lanes at certain locations along northbound and southbound US 41 from Memorial Drive to County M
- Reconstruct the Velp Avenue interchange including roundabouts at the ramp terminals and at the Velp Avenue/Memorial Drive intersection
- Reconstruct the County M interchange including roundabouts at the ramp terminals and at the County M/frontage road intersections
- Improve the I-43 interchange
- Construct new bridges over Velp Avenue, CN Railroad, Wietor Drive, I-43 and Duck Creek
- Replace the County EB/Lakeview Drive and County M bridges over US 41
- Realign Beaver Dam Creek to accommodate redesign and construction of the Velp Avenue interchange
- Build stormwater detention ponds at Velp Avenue and County EB/Lakeview Drive

In addition to the common design features listed above, Alternative E has the following unique design features at the I-43 interchange.

- Reconstruct I-43/US 41 System Interchange with directional ramps (all loop ramps eliminated).
- Realign US 41 mainline and raise northbound grade line to accommodate the southbound US 41 to southbound I-43 ramp and the northbound I-43 to southbound US 41 flyover ramp piers and foundations within the existing interchange footprint
- In order to accommodate the direct ramps at the I-43/US 41 interchange, eliminate existing access between Velp Avenue and I-43 via US 41; Atkinson Avenue or an alternate route would be used to access southbound I-43 from Velp Avenue or to access Velp Avenue from northbound I-43.

2.4.2 Alternative E Updates and Refinements

The following updates and refinements to Alternative E have been made based on more detailed engineering design information since the Draft EIS, as well as public, local government and agency comments on the Draft EIS.

Elimination of 5-Leg Roundabout at Velp Avenue Interchange

The 5-leg roundabout was presented at the March 2, 2011 public hearing as a possible design option for Alternatives D and E. This design option has now been eliminated from further consideration based on agency concerns about additional wetland impacts and input from the Village of Howard (concern about cost, impact to developable land, incompatibility with potential future development in the Memorial Drive area). The Village of Howard sent a letter to WisDOT on February 18 2011 confirming their rejection of the 5-leg roundabout (see Appendix C, page C26). Elimination of the 5-leg roundabout reduces wetland impacts by 1.1 acres and construction costs by \$2.3 million for both Alternative D and E.

The 4-leg roundabout that is proposed at this location will be modified to shorten the splitter island on the eastbound approach to allow a 'left out' movement to the development in the northwest quadrant of the Velp Avenue interchange. This driveway access was previously restricted to a right-in and right-out only access. A memorandum of agreement will be developed with the Village of Howard based on this proposed driveway access and the type of development that occurs at this site.

Revised Beaver Dam Creek Realignment

The Beaver Dam Creek realignment at the Velp Avenue interchange has been revised slightly in the Island Court area to allow for a larger proposed stormwater detention pond at this location. The revised creek realignment will require approximately 1.85 acres of additional right-of-way and two additional residential displacements, one of which is also a business, compared to the previously proposed realignment. There would be no other substantive changes in environmental impacts due to the revised creek realignment. The revised creek realignment is shown in Exhibit 2-2A (Page 2-24). It should be noted that the revised realignment would also have been applicable to Alternative D.

Bicycle/Pedestrian Accommodations

Based on further coordination with the Village of Howard since the Draft EIS, the previously proposed bicycle/pedestrian accommodations at the US 41 crossing of Duck Creek north of the I-43 interchange have been revised. See EIS subsection 4.7 for more information.

Extended Construction limits at County M/Lineville Road Interchange

For purposes of the Draft EIS, the construction limits at the County M interchange were just north of the County M structure over US 41. Based on additional engineering evaluation, WisDOT proposes to extend the project's construction limits at County M farther north to include the reconstruction of the northern County M interchange ramps. This extension would minimize traffic impacts for potential future projects on US 41 to the north. It should be noted that this extension would also have been made under Alternative D.

The refined construction limits would extend approximately 3,000 feet north of the County M bridge and the 6-lane to 4-lane transition would end just south of Woodfield Court. This would avoid impacts to a small channel that crosses under US 41 via a 42" culvert at Woodfield Court and which provides spawning habitat for Northern Pike. The extended construction limits would not affect the existing frontage roads adjacent to US 41, and would not require any new right-of-way.

Because WisDOT's 2006 wetland delineations did not encompass the extended project terminus, additional wetland impacts have been estimated based on delineations that were done when the County M interchange was part of a separate WisDOT corridor study (US 41 Green Bay to Abrams, Project I.D. 1150-46-00). The wetland delineations for that corridor study were done in 2008 by KL Engineering's wetland consultant, Natural Resources Consulting Inc.

Updated wetland delineations for the US 41 Memorial Drive to County M project will be done by WisDOT prior to a Clean Water Act permit application. At this time it is estimated that the extended US 41 terminus could impact an additional 2.8 acres of wetland, primarily due to reconstructing the interchange ramps north of County M. It should be noted that the extended terminus and additional wetland impacts would also have been applicable to Alternative D.

Revised Utility Adjustments

Since the Draft EIS, it has been determined that a larger stormwater pond is needed in the southwest quadrant of the Velp Avenue interchange. The larger stormwater pond and revised Beaver Dam Creek realignment at this location will also require a change in the conceptual adjustment for the Green Bay Metropolitan Sewage District (GBMSD) sanitary sewer in the Island Court area. As noted under "Revised Beaver Dam Creek Realignment", two additional residential displacements will be required at this location.

The conceptual American Transmission Company (ATC) utility adjustments as initially presented in the Draft EIS have not been revised. An additional meeting was held with ATC on April 27, 2011 to determine whether any revisions could be made to the conceptual alignment for the relocated transmission line that would cross wetland areas in the southeast quadrant of the I-43 interchange. At this time, ATC did not identify any changes to this alignment.

See EIS subsection 3.18.7 for more information on conceptual utility adjustments. It should be noted that the conceptual utility adjustments would also have been applicable to Alternative D.

Construction Access/Maintenance Roads

Since the Draft EIS, WisDOT has identified possible locations for access roads that will be needed for construction, maintenance and protection of the new structures at the I-43 interchange under Alternatives D and E. The access roads have not yet been designed, but they are typically constructed with clean fill and gravel. The roads will initially be wide enough to accommodate construction equipment. After completion of the project, some of the temporary access road fill that was needed for construction equipment will be removed, leaving a narrower 12 to 18 foot-wide permanent road for future maintenance access. The need for permanent access roads and other clear areas around the new bridge abutments and piers is driven in part by renewed concern about bridge security by FHWA and AASHTO (American Association of State Highway and Transportation Officials). See new Final EIS subsection 3.18.10, Construction Access Roads, for more information.

2.4.3 Basis for Selection of Preferred Alternative E

Selection of Alternative E as the preferred alternative was based on its ability to meet project purpose and need, ability to mitigate adverse environmental impacts, and review of agency and public input received during the Draft EIS comment period. Key reasons for selecting Alternative E are summarized below. It should be noted that Alternative E was selected as the preferred alternative based on the information provided in the Draft EIS which was the basis for the public hearing and for agency and public comments during the Draft EIS availability period. The subsequent refinements discussed in subsection 2.4.2 that would apply to both Alternatives D and E were not a factor in selecting Alternative E as the preferred alternative.

2.4.3(a) Purpose and Need Factors

Several key purpose and need factors as discussed in EIS Section 1 were considered in the selection of preferred Alternative E.

System linkage and route importance

US 41 is a backbone highway in the WisDOT's Connections 2030 plan and is also a National Highway System (NHS) route. I-43 is an existing interstate highway and US 41 has been identified for future conversion to an interstate highway. Therefore, both of these roadways are significant routes in the state transportation network. Both Alternatives D and E include improvements to the US 41/I-43 interchange, however Alternative E includes directional ramps which would provide safer and more efficient free flow movements for regional traffic. The loop ramps included under Alternative D would provide access between Velp Avenue and I-43, which is a movement intended more for local traffic and would not be as desirable in meeting the objective of the Connections 2030 plan intended to provide high quality highways designed with maximum service and safety characteristics.

Alternative E would be more compatible than Alternative D with future conversion of US 41 to an interstate facility. With elimination of the loop ramps under Alternative E, all traffic movements at the I-43 interchange would have a high level of service (LOS A or B) in the design year. By comparison, traffic movements at the I-43 interchange under Alternative D would operate at about LOS C which is acceptable but not desirable for an interstate freeway-to-freeway systems interchange.

Traffic and truck volumes

US 41 will be expanded to a 6-lane facility under both Alternatives D and E to provide additional capacity for existing and projected traffic volumes. The ramps connecting US 41 and I-43 will meet design standards with both alternatives, however the tight loop ramp configurations that would remain with Alternative D are less desirable than the directional ramps included with Alternative E, especially for large trucks utilizing this interchange.

Traffic operations

Projected traffic volumes indicate that many of the US 41 segments will reach or exceed capacity with the current configuration. The AM peak hours would have poor Level of Service (LOS) for southbound traffic and the PM peak hours would be substantially worse for northbound vehicles, thus demonstrating the need for improvements. Both Alternatives D and E would operate at LOS C or better, however the directional ramps included with Alternative E would provide better traffic operations than the loop ramps under Alternative D. All movements for Alternative E would operate at either LOS A or B in the design year.

Geometric deficiencies

Under both alternatives D and E, the roadways connecting I-43 with US 41 to the north would meet a 70 mph design speed. The connections between I-43 and US 41 to the south would meet a 60 mph design speed under Alternative E. This is more desirable than the loop ramps under Alternative D that would accommodate those movements at a 30 mph design speed.

Safety

Crash rates within the project limits are among the highest in the Brown County US 41 corridor. By addressing many of the existing geometric deficiencies, both Alternatives D and E would improve safety. The loop ramps that have been identified as a major safety concern would remain under Alternative D. However, several measures would be included to address some of those concerns such as longer ramp tapers, improved signing, lighting, and accommodating traffic weaving movements on a lower speed collector distributor road.

A Road Safety Audit (RSA) was undertaken by WisDOT in January, 2011 to identify potential safety concerns with Alternatives D and E. The final report completed in March, 2011, is available for review at WisDOT's US 41 Brown County project office, 1940 West Mason Street, Green Bay. The RSA included an evaluation of potential geometric concerns and other issues associated with traffic operations. It also determined the expected frequency and severity of crashes and these elements were then combined to obtain a risk assessment ranking from A to F (A—lowest risk and lowest priority; F—highest risk and highest priority).

A total of 8 issues were identified for Alternative D (5 issues with a ranking of C, and 3 issues with a ranking of D which is defined as a significant risk level). A total of 5 issues were identified for Alternative E, all with a risk ranking of C. One of the main areas of concern in Alternative D was the northbound US 41 to southbound I-43 loop ramp movement which indicated a significant risk of truck rollover crashes and which also showed a potential for twice the number of crashes than for the free flow ramp movement configuration under Alternative E.

Although minor improvements to the loop ramps at the I-43 interchange would be made under Alternative D, they would still have essentially the same configuration as the existing loop ramps. According to the RSA, even with reflective chevrons, guard rail and additional warning signs, there would still be a potential for truck rollovers due to the combination of tight curve radii and reverse curves. In addition, the speed differential between the US 41 mainline and the loop ramps could increase the risk of rear-end crashes as well as rollover crashes within the loop ramps.

2.4.3(b) Environmental Impacts and Mitigation Measures

Based on the impact summary table prepared for the Draft EIS (Exhibit S-2), the overall environmental impacts for Alternatives D and E were similar with the exception of the following items:

- The construction cost for Alternative E was estimated at \$10 million more than Alternative D (Alternative D \$220 million and Alternative E \$230 million)
- Alternative E would require approximately 8 more acres of new right-of-way acquisition than Alternative D (Alternative D 29 acres and Alternative E 37 acres)
- Alternative E would affect approximately 4.5 more acres of public use land than Alternative D (Alternative D 8.4 acres and Alternative E 12.2 acres)

Alternatives D and E were designed to minimize impacts to wetlands and public use lands to the maximum extent practicable. Key measures to minimize impacts to these resources are discussed in EIS subsection 3.7.2 (wetlands) and subsection 4.5 (public use lands)

2.4.3(c) Agency and Public Input

In addition to engineering design factors, input from cooperating and participating agencies (state and federal review agencies and local governments), and public input as summarized below was considered in selection of Alternative E as the preferred alternative.

Cooperating and Participating Agency Input

Coordination with cooperating, participating, and other agencies in the EIS process has been ongoing during development and refinement of the alternatives and preparation of the EIS. Detailed information on agency meetings and other coordination is provided in EIS Section 5.

One of the main concerns about Alternatives D and E was the previously considered 5-leg roundabout design option at the Velp Avenue interchange. Agencies questioned the need for the 5-leg roundabout and were concerned about the direct wetland impact (1.1 acres) and possible additional indirect wetland impacts. This design option has been eliminated from further consideration.

Agencies were also concerned about the overall wetland impacts for Alternatives D and E. Early in the process, wetland impacts were about 64 acres for Alternative D and 85 acres for Alternative E. Through additional design refinements for both alternatives, in particular lengthening existing bridges and constructing new bridges to span wetlands, the wetland impacts were substantially reduced and were essentially the same for both alternatives.

Agency comments on the Draft EIS are summarized in new Final EIS subsection 5.3.3, Agency Coordination During Final EIS Activities. Agency letters and WisDOT's comment responses are included in Appendix C, Agency Correspondence.

In accordance with the Coordination Plan prepared as part of the SAFETEA-LU Section 6002 environmental process, participating and cooperating agencies were notified about the preferred alternative (Alternative E) and provided an opportunity to concur in the preferred alternative. A Preferred Alternative Technical Memorandum was distributed to agencies on April 22, 2011. The memorandum included updated information on Alternative E and reasons why it was selected by WisDOT and FHWA as the preferred alternative for presentation in the Final EIS.

Agency input on the preferred alternative is summarized as follows:

May 19, 2011 (Appendix C, page C31)—E-mail correspondence with Brown County Planning Commission. Brown County had no comments on the preferred alternative.

May 19, 2011 (Appendix C, page C32)—E-mail correspondence with the Village of Howard. The Village of Howard indicated WisDOT has kept them informed about the preferred alternative and that the Village Board has not taken a position or commented on the preferred alternative.

May 19, 2011 (Appendix C, page C33)—Letter from USACE concurring in the preferred alternative.

May 19, 2011 (Appendix C, page C34)—Letter from DNR supporting WisDOT's selection of Alternative E as the preferred alternative.

May 23, 2011 (Appendix C, page C35)—Letter from U.S. Fish and Wildlife Service indicating WisDOT has addressed their concerns in the preliminary responses to agency comments on the Draft EIS and that they therefore concur in the preferred alternative. Fish & Wildlife reiterated their desire to see a final letter from the Village of Howard agreeing to the proposed Section 4(f) and Section 6(f) mitigation measures. The Village of Howard letter dated May 18, 2011 is provided in EIS Section 4 as Exhibit 4-5.

May 24, 2011 (Appendix C, page C36)—Letter from EPA concurring in the preferred alternative.

Public Input

Public input received as part of the public hearing process is summarized in new Final EIS subsection 5.4.4. A total of 47 comments were received either at the public hearing itself or after the public hearing during the Draft EIS comment period that ended on March 28, 2011. Of those who specifically indicated support for Alternatives D or E, 31 people favored Alternative D and 11 people favored Alternative E.

The primary reasons mentioned for supporting Alternative D were that this alternative would maintain the existing access between I-43 and Velp Avenue via US 41, and would cost \$10 million less to construct than Alternative E. The primary reasons mentioned for supporting Alternative E were that this alternative would improve safety by eliminating the existing loop ramps at the I-43 interchange, would provide safe and efficient access to I-43, and would be a better long-term solution than Alternative D.

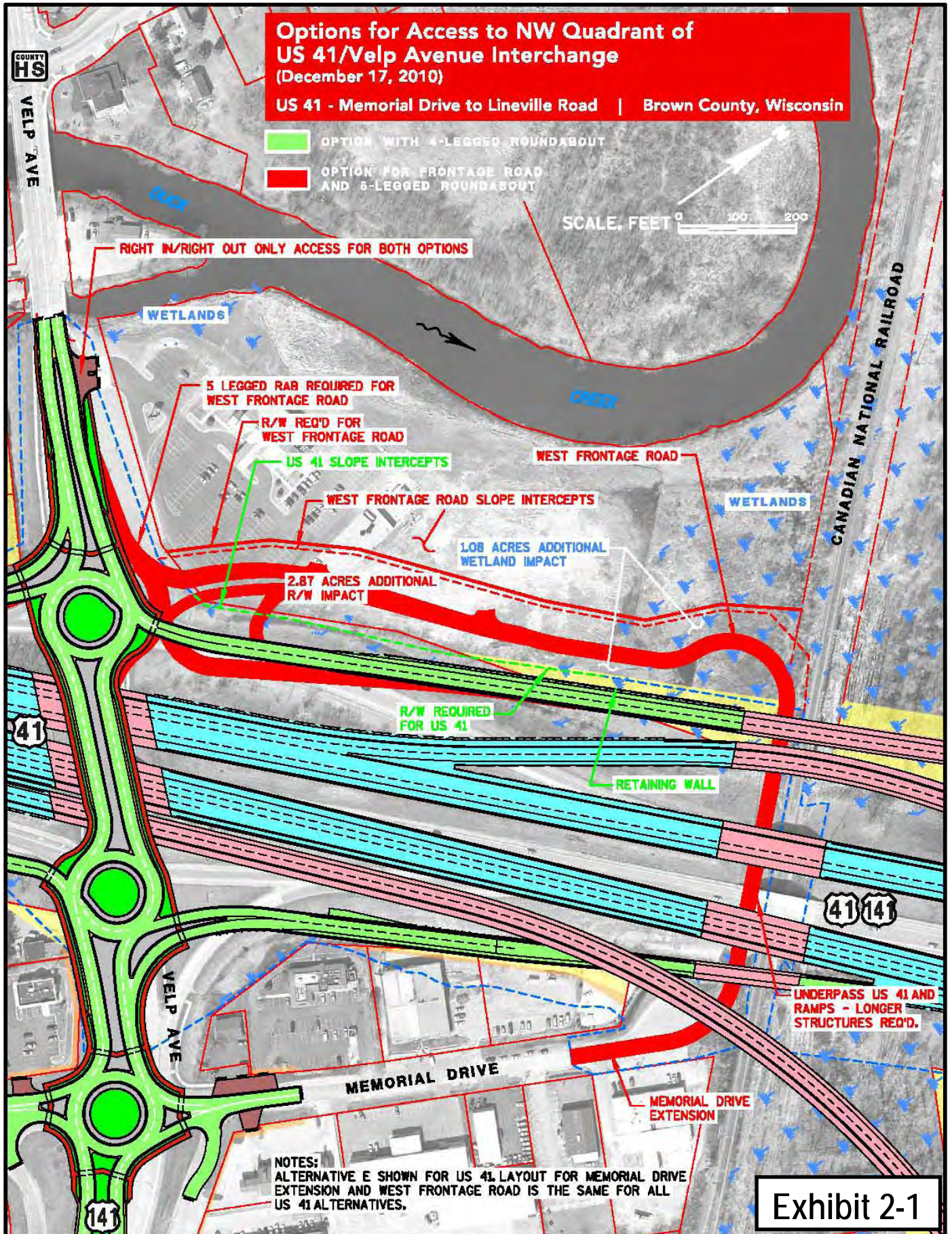
Key concerns about removing the existing Velp Avenue access under Alternative E are summarized in EIS subsection 5.4.4 along with WisDOT's responses to these concerns.

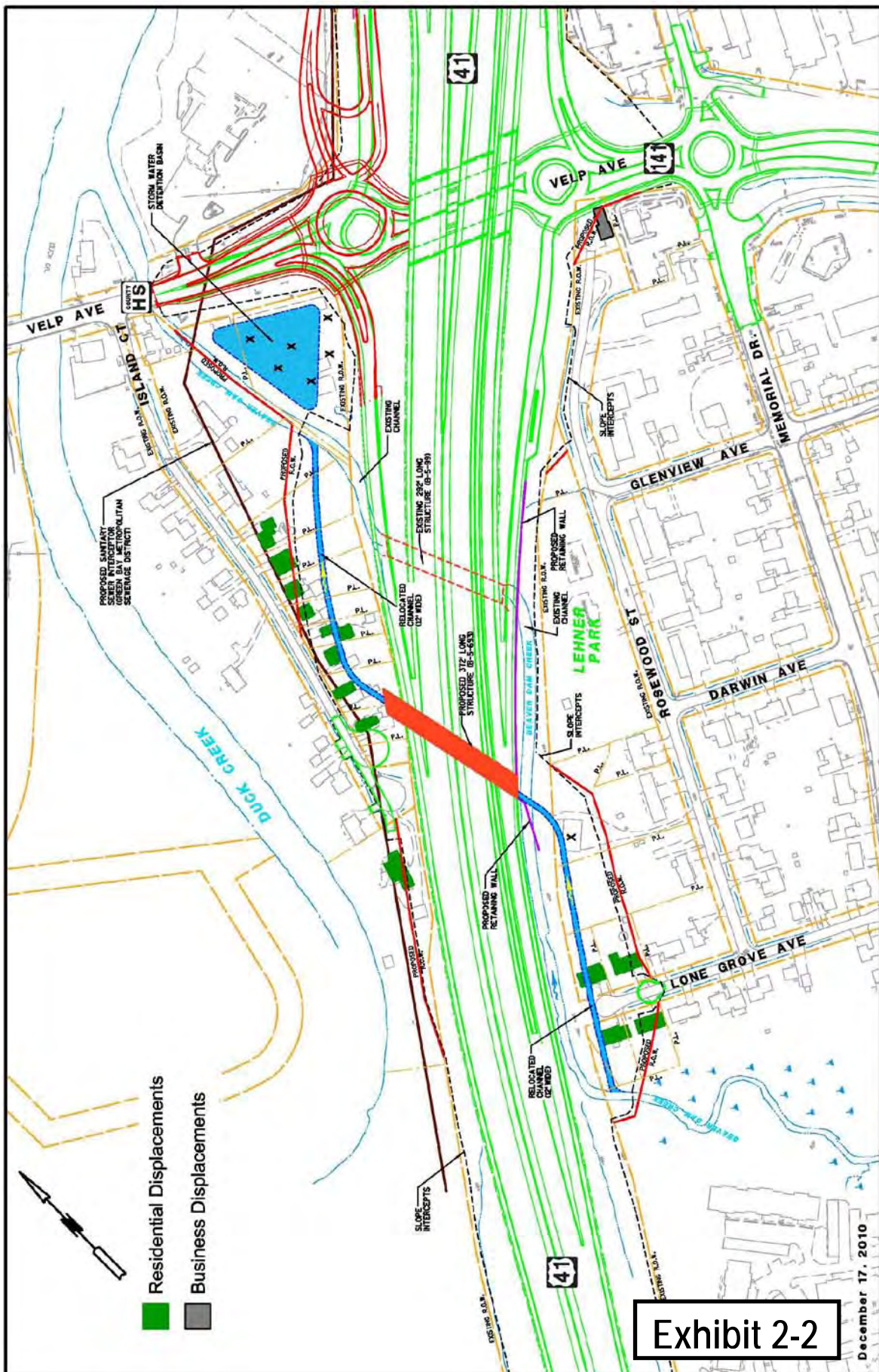
Additional issues and concerns raised as a result of the public hearing process are discussed in EIS subsection 5.4.4. These included concerns about roundabouts, drainage and stormwater discharge in the Lakeview Drive area, and the need to construct the project in stages so that the Velp Avenue, Lakeview Drive and County M bridges are not all closed at the same time.

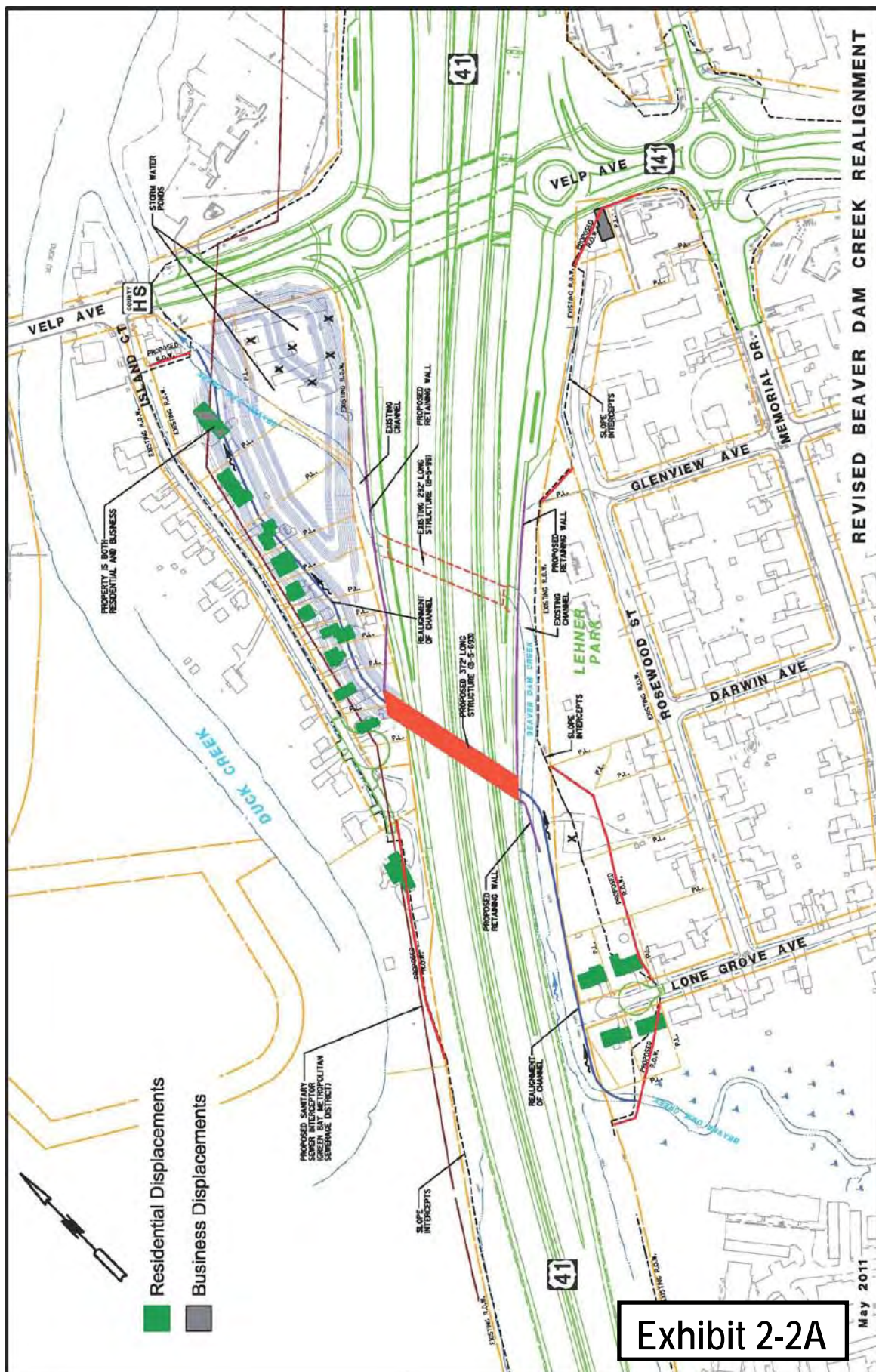
2.4.4 Conclusion

Alternative E with the proposed design refinements noted in subsection 2.4.2 has been identified as the preferred alternative because it provides the best solution for addressing long-term mobility needs and safety concerns while minimizing impacts to existing development and environmental resources to the maximum extent practicable.

Unavoidable impacts for Alternative E to wetlands, public use lands, stream crossings, and displacement of homes and businesses will be fully mitigated. Coordination with state and federal regulatory agencies will continue in the final design phase to evaluate additional ways to further minimize impacts to environmental resources. There will also be additional public involvement opportunities in the final design phase that will be conducted over the next several years.







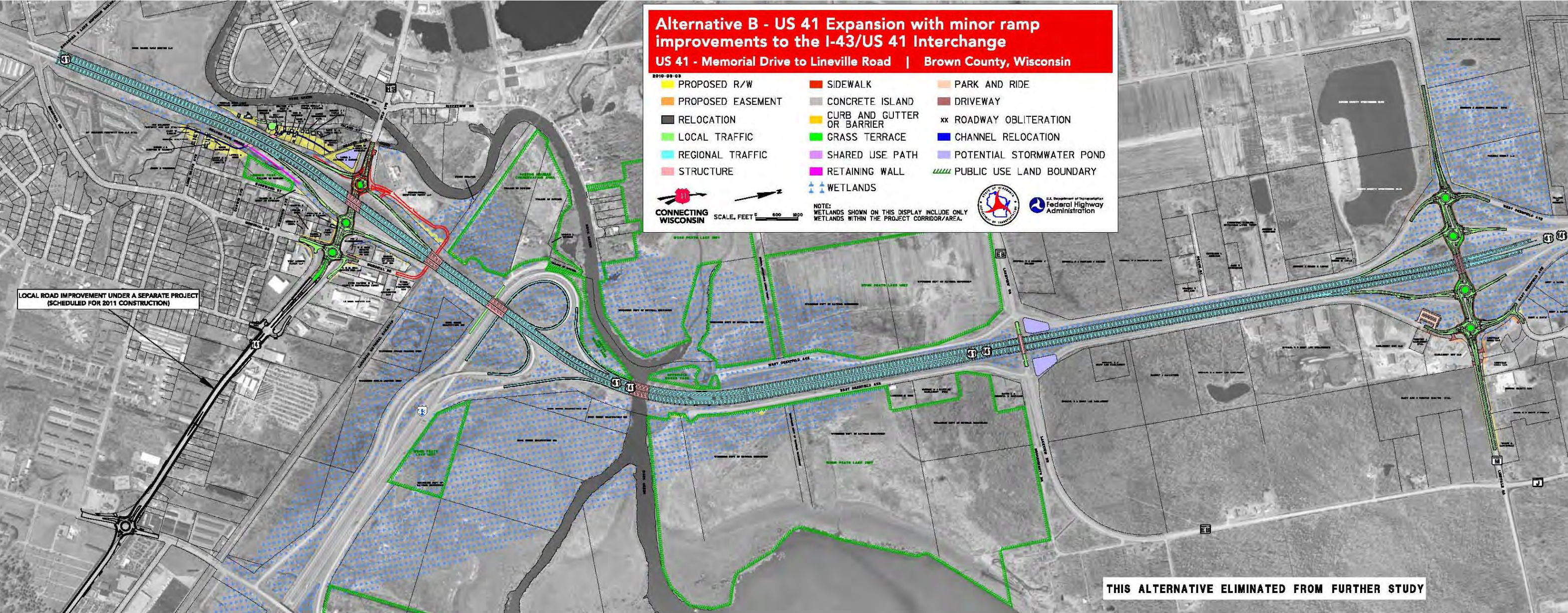


Exhibit 2-3

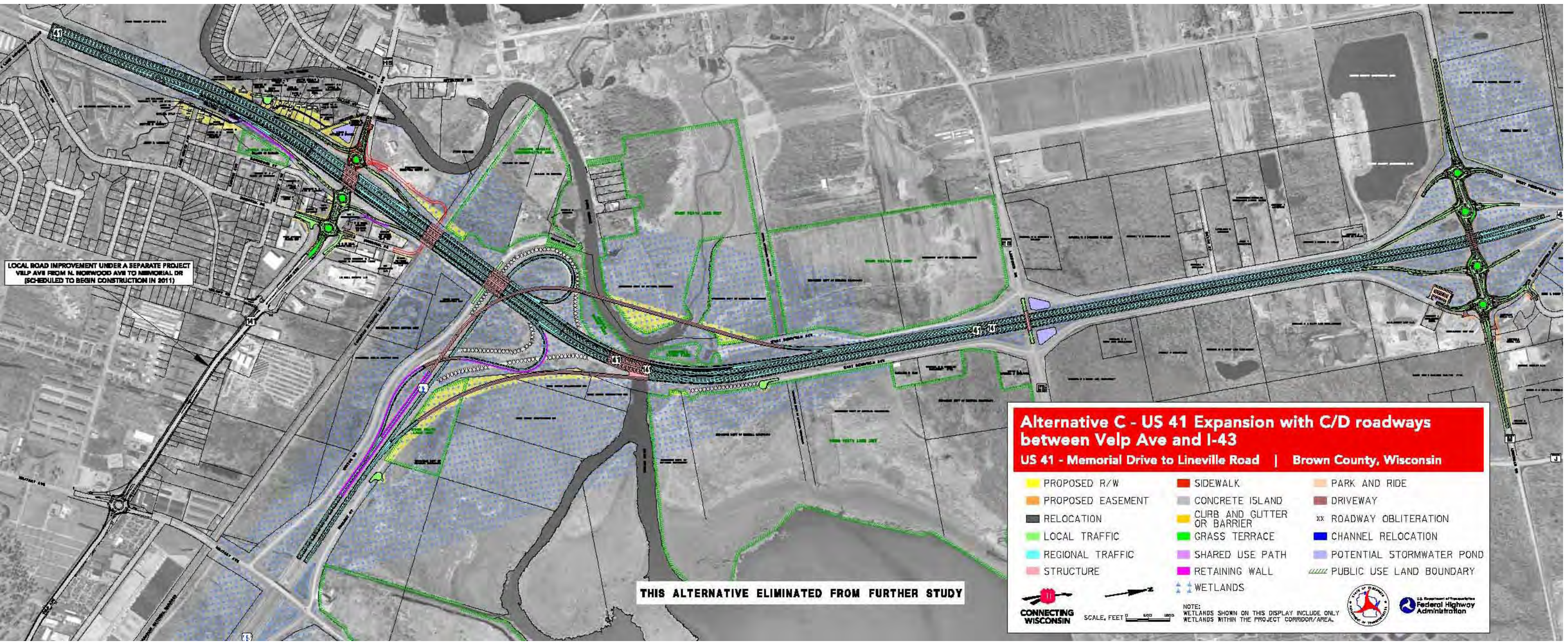


Exhibit 2-4

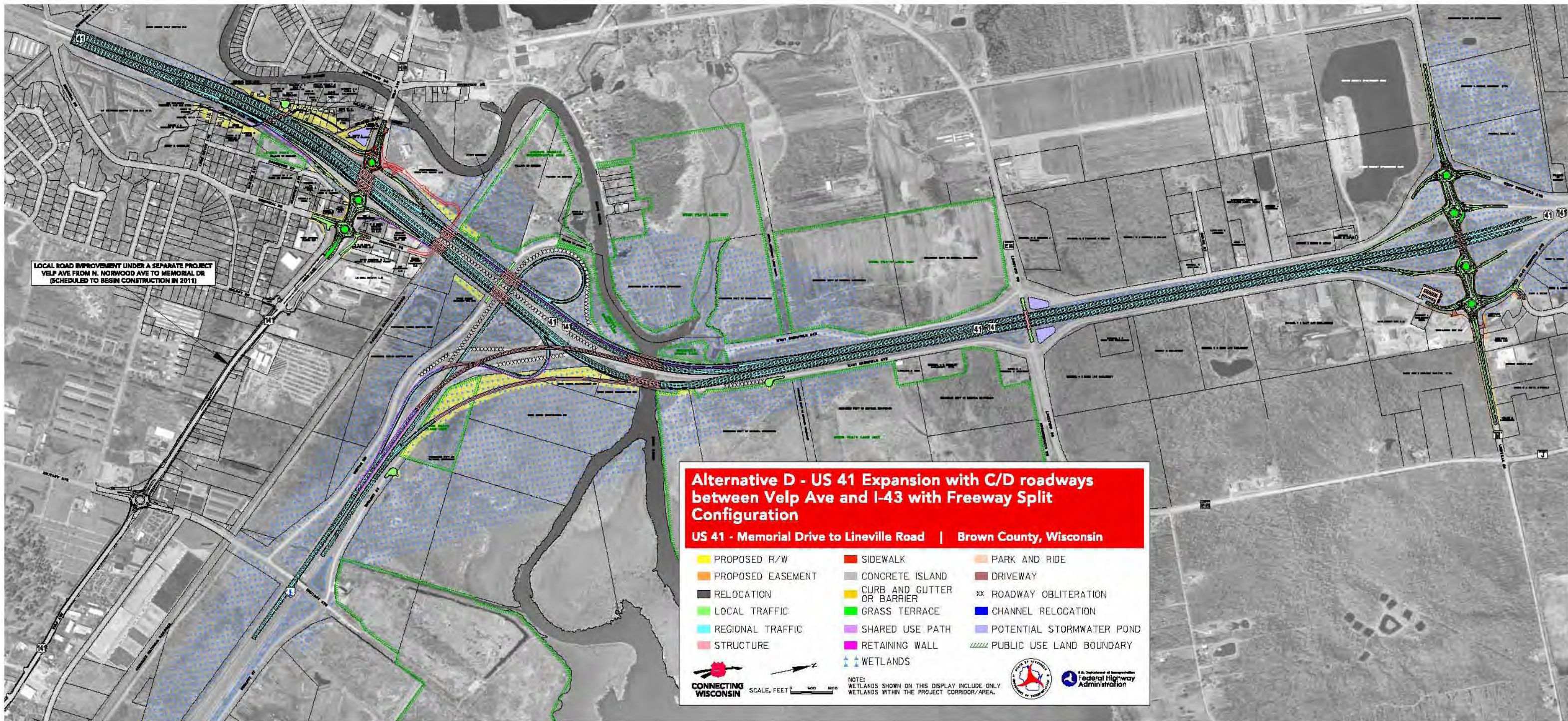


Exhibit 2-5

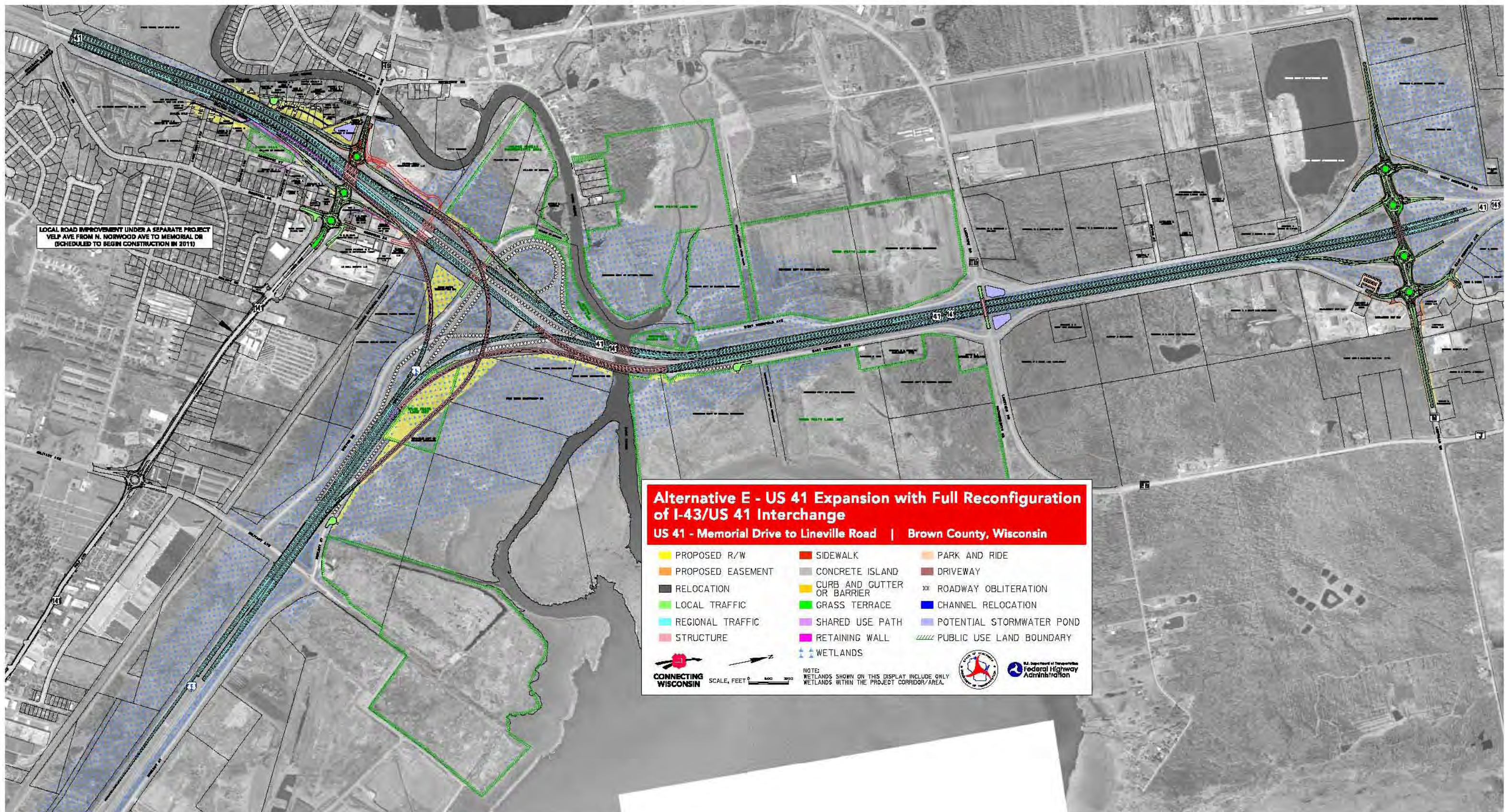


Exhibit 2-6

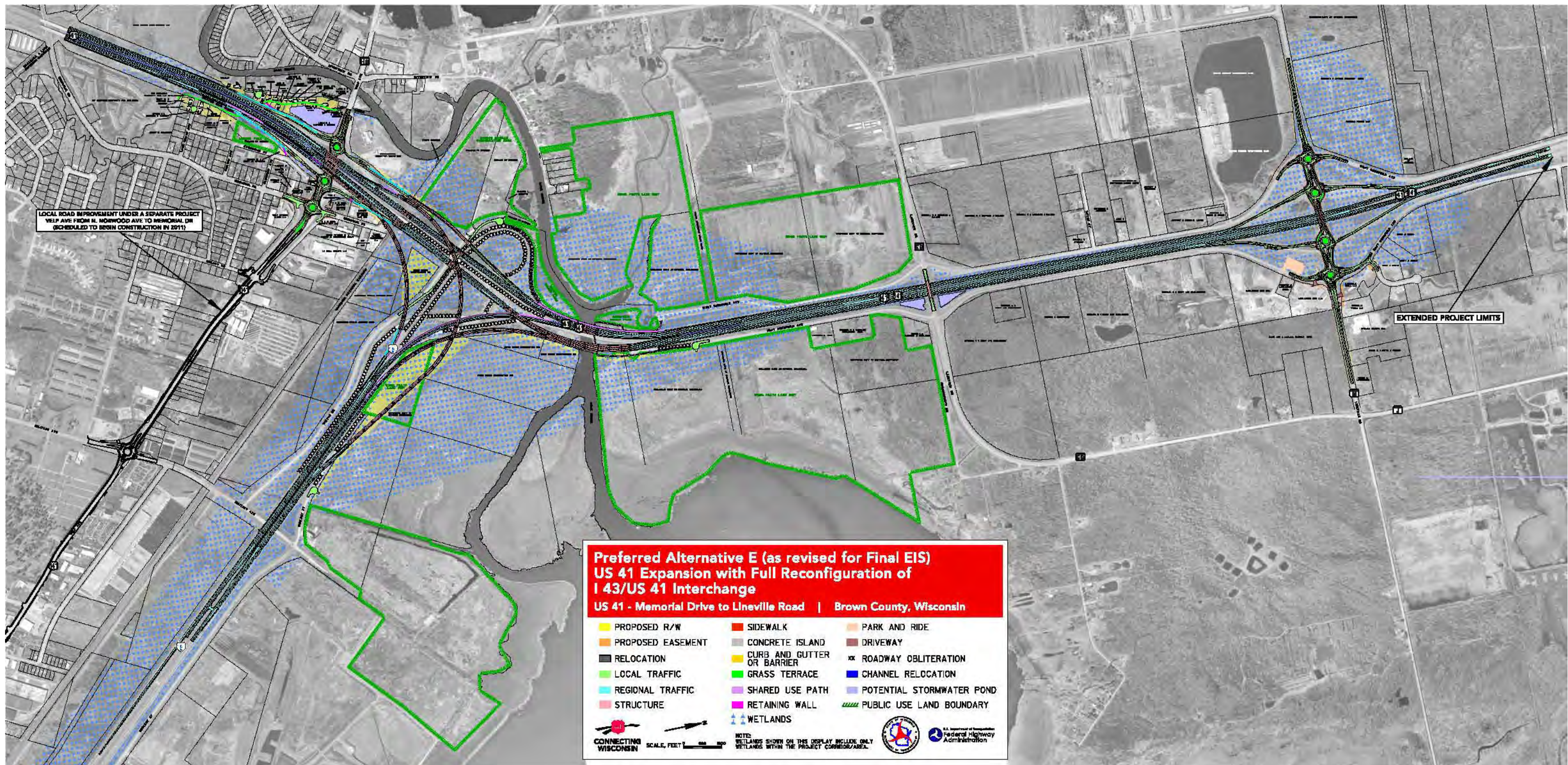


Exhibit 2-7

SECTION 3
Existing Conditions, Environmental Impacts and Measures to Mitigate
Adverse Impacts

SECTION 3

Existing Conditions, Environmental Impacts and Measures to Mitigate Adverse Impacts

Section 3 describes existing conditions in the US 41 Memorial Drive to County M project corridor, the beneficial and adverse socioeconomic and environmental effects of the No Build Alternative and Build Alternatives D and E, and measures to minimize and mitigate adverse effects. To minimize duplication in the EIS, discussion of applicable environmental factors is referenced to other EIS sections and/or EIS appendices.

Applicable impact discussions in Final EIS section 3 have been updated to reflect Preferred Alternative E and the refinements/updates that have been made since the Draft EIS. Applicable impact discussions have also been revised and updated in response to agency comments on the Draft EIS.

3.1 Transportation and Land Use Planning

Transportation, land use and related documents relevant to the US 41 Memorial Drive to County M project area are summarized in Table 3-1.

Table 3-1
Summary of Transportation, Land Use and Related Documents

Entity	Plan Name	Year Adopted	Comments
Federal Transportation Legislation	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU).	2005	US 41 is designated as a National Highway System (NHS) route. US 41 is also proposed for conversion to an Interstate Highway between Milwaukee and Green Bay.
FHWA	Transportation Management Plans (TMPs) for Work Zones	2004	A TMP lays out coordinated transportation management strategies and describes how they will be used to manage the work zone impacts of a project. The scope of the TMP depends on expected work zone impacts and whether the project is significant. A significant project is one that alone or in combination with other concurrent nearby projects is anticipated to cause sustained work zone impacts that are greater than what is considered tolerable based on the agency's policy and engineering judgment and that would have a relatively high level of disruption. For projects not classified as significant, the TMP may consist of a Temporary Traffic Control plan (TTC). The level of traffic control and documentation needed for the US 41 project will be determined in the final design phase when more detailed information is available relative to construction staging.
WisDOT	Connections 2030, WisDOT Long-range Transportation Plan	2009	Establishes system-level priority corridors critical to statewide travel patterns and the state's economy. The plan also includes Corridors 2030 backbone highways. The US 41 corridor in Brown County is included in the Green Bay Metropolitan Planning Area priority corridor. Projects include US 41 capacity expansion and interchange improvements, and conversion of US 41 to an Interstate Highway from Milwaukee to Green Bay. US 41 is a designated multi-lane backbone highway.

Entity	Plan Name	Year Adopted	Comments
DNR	Wisconsin Land Legacy Report	2006	The purpose of the report is to identify places considered important in meeting the State's conservation and recreation needs. The report identifies 229 Legacy Places, including the Suamico, Little Suamico, and Pensaukee Rivers, which lay to the north of the US 41 corridor study area in Oconto County.
Brown County	Green Bay Metropolitan Planning Organization Long-range Transportation Plan	2005	Includes proposed US 41 expansion from County F near DePere to County M in the Village of Howard.
Brown County	2010-2014 Transportation Improvement Program for Green Bay Urbanized Area	2009	Includes proposed US 41 expansion from County F to County M, and conversion of US 41 to an Interstate Highway from Milwaukee to Green Bay.
Brown County	Brown County Comprehensive Plan	2007	Acknowledges future US 41 expansion and interchange improvements from County F to I-43.
Brown County	Park and Outdoor Recreation Plan, 2008-2013	2008	Identifies countywide recreation needs and cultural, historical, and natural resources that should be considered for possible protection, preservation or restoration. The Plan proposes a trail area in the City of Green Bay near Military Avenue.
City of Green Bay	Green Bay Smart Growth 2022	2003	Acknowledges future US 41 expansion and conversion of US 41 to an Interstate Highway from Milwaukee to Green Bay.
Village of Suamico	Village of Suamico Comprehensive Plan	2005	Acknowledges US 41 expansion, and potential land use changes that may occur in Suamico as a result of expansion.
Village of Howard	Village of Howard Comprehensive Plan	2002	Includes proposed US 41 expansion and interchange improvements within Village of Howard limits.
Bay-Lake Regional Planning Commission	Bay-Lake Regional Planning Commission Regional Comprehensive Plan	2005	Acknowledges future US 41 expansion and conversion of US 41 to an Interstate Highway from Milwaukee to Green Bay.

Existing Land Use

Existing land use in the US 41 Memorial Drive to County M corridor is illustrated in Exhibit 3-1 (Page 3-66). The project area contains a diverse range of land uses, from sensitive natural areas/environmental corridors on the north end and surrounding the Bay of Green Bay, to highly urbanized areas south of Velp Avenue.

Natural Areas/Woodlands/Undeveloped Open Space predominates along US 41, north of the I-43/US 41 interchange.

There are concentrations of residential land uses south of Velp Avenue in the southeastern part of the Village of Howard, and in the Memorial Drive area in the southern part of the village. There are several pockets of rural residential development and scattered homes adjacent to US 41 in the northeast part of the Village of Howard.

The main area of commercial land use within the US 41 project area is at the Velp Avenue interchange. This area is part of a series of strip developments along Velp Avenue, Military Avenue, and a portion of Glendale Avenue. These developments are a mixture of highway-oriented uses and neighborhood businesses that include small suburban strip malls, gas stations/convenience stores, taverns and restaurants, small office complexes, and various retail stores.

Future Land Use

Future land use is illustrated in Exhibit 3-2 (Page 3-67). Future land use maps indicate that residential and industrial development is planned along US 41 north of the I-43/US 41 interchange. Land use south of the interchange is anticipated to remain similar to its present use.

3.2 Indirect and Cumulative Effects

The indirect and cumulative effects (ICE) analysis for proposed improvements in the US 41 Memorial Drive to County M project section was conducted by Vandewalle & Associates in accordance with WisDOT's 2007 *Guidance for Conducting a Cumulative Effects Analysis* and *Guidance for Conducting an Indirect Effects Analysis*. Key findings are summarized below. The ICE analysis report is available upon request at the WisDOT Northeast Region office.

The ICE analysis utilized a local expert panel approach to obtain input on existing planning and development patterns and how development patterns could change as a result of the US 41 project alternatives. The panel included the Green Bay Metropolitan and Brown County planner, representatives from the Village of Howard, and the manager of the regional port authority. Information packets were sent to participants in preparation for a workshop held on October 5, 2010. The packets included information on indirect and cumulative effects, study area inventory (natural resources, existing and future land use maps), alternatives summary and maps, and a questionnaire to facilitate discussion at the workshop.

The ICE analysis included the following alternatives (see EIS Section 2 for more information):

- Alternative A—No Build
- Alternative C—US 41 expansion with minor ramp improvements to I-43/US 41 interchange
- Alternative D—US 41 expansion with C/D roadways between Velp Avenue and I-43
- Alternative E—US 41 expansion with C/D roadways between Velp Avenue and I-43 and freeway split configuration

Alternative C was subsequently eliminated from further consideration by WisDOT (see Section 2). Alternatives D and E include the five-legged roundabout option with local access frontage road at the Velp Avenue interchange.

Expert panel participants were asked to respond to the following questions for each alternative in preparation for additional discussion at the workshop:

- What changes do you anticipate in the study area under the [alternative] with regard to residential, commercial, industrial and institutional development (less, more or about the same development)?
- What do you feel will be the impact of the [alternative] on farmland, wetlands, woodlands, historic sites, community character, other resources (ranging from no impact to high impact)?
- In general will greenfield development in the study area increase or decrease as a result of the [alternative]? greenfield development is that which occurs on previously undeveloped land.
- In general, will infill and redevelopment in the study area increase or decrease as a result of [alternative]?

The ICE analysis area is shown on Figure 3-1. It encompasses a reasonable area of influence along US 41 and I-43 commensurate with the scope of the proposed US 41 improvements.

The results of the ICE analysis are summarized in Sections 3.2.1 and 3.2.2.

Figure 3-1: Indirect and Cumulative Effects Analysis Area



3.2.1 Indirect Effects

Indirect effects are defined as project impacts caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects or other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on air and water and other natural systems, including ecosystems (Council on Environmental Quality (CEQ) Regulations for Implementing NEPA, 40 CFR Part 1508).

Potential indirect effects of Alternative A (No build) and Build Alternatives D and E that have been retained for detailed study in the EIS are summarized in Table 3-2. These are the indirect effects that were identified by the local expert panel.

**Table 3-2
Summary of Indirect Effects**

Indirect Effects Considered in ICE Analysis	Alternatives		
	Alternative A No Build	Alternative D US 41 expansion with C/D roadways between Velp Avenue and I-43	Alternative E US 41 expansion with C/D roadways between Velp Avenue and I-43 and freeway split configuration
Traffic patterns	Increased traffic on US 41 could cause local traffic to divert to local roadways having a positive impact on US 41 and a negative impact on local roadways.	US 41 improvements could result in actual or perceived travel time reductions. This could encourage residents and businesses to locate farther away. As a result, neighboring communities to the north could experience an increase in population/employment growth. On the other hand, the US 41 improvements could also encourage infill and redevelopment within the US 41 project area.	Same as Alternative D with this additional input: Elimination of present access between Velp Avenue and I-43 would decrease traffic volumes on US 41 and I-43 while increasing traffic on Velp Avenue, and at the Velp Avenue and I-43/Atkinson Drive interchanges.
Wetlands	Small, isolated wetlands are not regulated by municipal wetland regulations. Increased congestion on US 41 would reduce likelihood of infill/redevelopment adjacent to US 41. Therefore, development of wetlands in outlying greenfield areas could occur. Lack of the 5-legged roundabout at the Velp Avenue interchange could delay timing of development in the Black Forest Restaurant area which is adjacent to regulated wetlands.	Wetland fill due to the expanded US 41 footprint could result in continued spread of invasive species (phragmites, reed canary grass, purple loosestrife). Incremental development of unprotected wetlands will likely occur at a slightly accelerated rate. The 5-legged roundabout at the Velp Avenue interchange would encourage development of vacant land north of the Black Forest Restaurant. Additional development would pose potential impacts to Duck Creek and adjacent wetlands.	Same as Alternative D.
Farmland/woodland	Without US 41 improvements, development would occur in less congested areas leading to conversion of farmland and woodlands to urban development.	US 41 improvements could facilitate regional growth within and beyond the study area thereby leading to conversion of farmland and woodland to urban development. The improvements could also facilitate infill and redevelopment adjacent to US 41.	Same as Alternative D.
Water quality (Duck Creek, Beaver Dam Creek, Bay of Green Bay)	Increasing traffic volumes and stormwater runoff could further impact these water resources which have already been negatively affected by past land use practices.	Increasing traffic volumes and stormwater runoff from the expanded highway could further impact these water resources which have already been negatively affected by past land use practices.	Same as Alternative D.
Threatened or endangered species	Spot improvements would have minimal effect on potential threatened or endangered species habitat.	US 41 improvements could expand existing barriers between wildlife habitat areas.	Same as Alternative D.
Business impacts	With increased congestion on US 41, local businesses may choose to relocate to less congested areas. New businesses could also be dissuaded from locating along the US 41 corridor.	US 41 improvements could encourage denser commercial and industrial development along the corridor, including new businesses. The 5-legged roundabout and local frontage road at the Velp Avenue interchange could spur infill development and redevelopment particularly along Velp Avenue, including vacant land north of the Black Forest Restaurant. The US 41 improvements could also accelerate new development in planned growth areas.	Same as Alternative D with this additional input: Elimination of present access between Velp Avenue and I-43 could result in slower infill and redevelopment along Velp Avenue west of US 41 than would occur under Alternative D. Alternatively, increased traffic on Velp Avenue east of US 41 could result in more rapid infill and redevelopment along Velp Avenue east of US 41 than would occur under Alternative D.

Indirect Effects Considered in ICE Analysis	Alternatives		
	Alternative A No Build	Alternative D US 41 expansion with C/D roadways between Velp Avenue and I-43	Alternative E US 41 expansion with C/D roadways between Velp Avenue and I-43 and freeway split configuration
Neighborhood impacts	Potential diversion of local traffic from US 41 to local streets could cause noise and air quality impacts to residential areas.	Thirteen homes will be directly impacted (acquired). There could be marginal additional noise impacts in nearby residential areas. There would be minimal indirect impacts on long-term integrity of home values.	Same as Alternative D.
Community character	Roundabouts would have a positive effect on community character. Because these are not part of Alternative A, this is viewed as a missed opportunity to improve community character.	Potential economic growth coupled with local land use and zoning could ultimately result in improved community character. Roundabouts would have a positive effect on community character.	Same as Alternative D.
Historic sites	No impacts identified.	No impacts identified.	No impacts identified.
Notes: 1. Summary of Indirect Effects listed in this table were identified by the local expert panel.			

As noted in Table 3-3, the expert local panel identified three main resources that would likely be affected in the future by incremental planned development (small wetlands not protected by municipal wetland regulations, farmland, and woodland). These resources have also been affected by past incremental actions over time. According to the Brown County Comprehensive Plan, wetlands occupied about 10% of the county in the mid 1800's based on land survey information at that time. This estimate is noted as probably being conservative because the survey likely did not include most small wetland areas. Based on the county's 2000 land use inventory, wetlands currently occupy about 45 square miles or 8% of the county. The comprehensive plan indicates that agricultural land decreased by about 22% between 1970 and 2000, and is expected to decline by another 20% by year 2030. Based on an inventory by the U.S. Forest Service, woodlands occupied about 14% of Brown County in 1996. According to the county's 2000 land use inventory, woodlands now occupy about 11% of the county.

In summary, the expert local panel did not identify any substantive cumulative effects for Alternatives D or E compared to Alternative A (no build). The proposed US 41 improvements, within the context of other past and reasonably foreseeable actions, are likely to contribute slightly to the pace of population growth and development in the study area. Because land along US 41 is already largely built out, plans for the study area generally call for infill and redevelopment of land surrounding the US 41 corridor. As a result, the contribution of the proposed US 41 improvements to future cumulative resource loss would likely be minimal.

3.2.2 Cumulative Effects

Cumulative effects are defined as the impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time (40 CFR, Part 1508).

The cumulative effects analysis addressed resources identified to have either direct or indirect effects as a result of the proposed US 41 improvements. The study area for cumulative effects was the same as the indirect effects study area (Figure 3-1). The timeframe for the cumulative effects analysis is 25 years, which generally corresponds to the 2035 design year for the US 41 project. Local and regional comprehensive plans also have a 20-40 year planning timeframe.

Other past, present and reasonably foreseeable actions or activities that could also contribute to cumulative effects in the analysis area were identified by the expert panel and US 41 project team:

WisDOT Actions

In addition to the US 41 Memorial Drive to County M project, other highway improvements within or adjacent to the ICE analysis area are also being proposed or studied:

- Expansion of US 41 and reconstruction of the interchanges from County F/Scheuring Road in DePere to Memorial Drive in the Village of Howard.
- Future expansion of US 41 between County M/Lineville Road and County B.
- Future conversion of US 41 to an Interstate highway.
- Right-of-way preservation for future conversion of WIS 29 to a freeway facility from the Shawano County line to US 41.
- WIS 172 improvements (roundabouts near Austin Straubel International Airport and pavement rehabilitation from US 41 to I-43).

Wisconsin Department of Natural Resources actions

Through its Land Legacy Report, DNR has identified important places to be preserved for conservation and recreation for the next 50 years including preservation of waterways to protect fish populations in the bay of Green Bay.

Department of Agriculture, Trade, and Consumer Protection actions

Through the state's Working Lands Initiative, DATCP has prepared a schedule by which counties are required to update their farmland preservation plans. Brown County is scheduled to update its plan in 2019.

Study area community actions

The Village of Howard and Village of Suamico comprehensive plans indicate that environmentally sensitive areas such as wetlands and floodplains should not be developed. Both plans encourage the continuation of farming operations over the next 20 years, but also allow future development on agricultural land as outward growth continues.

The City of Green Bay will continue protecting wetlands and floodplains through existing and updated zoning ordinances and by following guidelines in the city's surface water management plan. The city's comprehensive plan states that agricultural land is considered an interim use that will gradually be converted to other uses.

Potential cumulative effects of Alternative A (No Build) and Build Alternatives D and E that have been retained for detailed study in the EIS are summarized in Table 3-3. These are the cumulative effects that were identified by the local expert panel.

**Table 3-3
Summary of Cumulative Effects**

Cumulative Effects Considered in ICE Analysis	Alternatives		
	Alternative A No Build	Alternative D US 41 expansion with C/D roadways between Velp Avenue and I-43	Alternative E US 41 expansion with C/D roadways between Velp Avenue and I-43 and freeway split configuration
Wetlands	Small, isolated wetlands are not regulated by municipal wetland regulations. Incremental development of unprotected wetlands will likely occur over time in areas planned for development beyond the US 41 project area, particularly to the north (Village of Suamico and southern Oconto County)	Same as Alternative A with this additional input: Alternative D will directly affect approximately 55 acres of wetland that will be fully compensated through state and federal requirements and there will be no net loss of wetland. However, the increase in the amount of disturbed land due to the expanded roadway footprint could result in the spread of invasive species beyond the study area, particularly along US 41 in the Village of Suamico and southern Oconto County. Note: 57 acres of wetland impact for Alternative E assumed in ICE analysis; impacts have since been updated to 55 acres.	Same as Alternative D. Note: 57 acres of wetland impact for Alternative E assumed in ICE analysis; impacts have since been updated to 54 acres.
Farmland/woodland	Development of farmland and woodland will occur with or without US 41 improvements because such areas are generally designated for development in local comprehensive plans. Without US 41 improvements, development would likely occur in less congested areas leading to modest acceleration of planned development of farmland and woodland in the Village of Suamico, southern Oconto County, and Village of Hobart.	Same as Alternative A with this additional input: The US 41 improvements could accelerate new development beyond the study area and may also increase infill and redevelopment along US 41. Incremental loss of farmland and woodland will likely occur at a more rapid rate than under Alternative A.	Same as Alternative D.
Threatened or endangered species	Over time, impacts to threatened or endangered species habitat could occur as land is developed in accordance with community comprehensive plans.	Same as Alternative A with this additional input: The US 41 improvements have the potential for impacting threatened or endangered species habitat beyond the study area, particularly in the Village of Suamico and southern Oconto County, without proper protection through local planning and zoning and other state and federal permitting practices.	Same as Alternative D.
Business impacts	With increased congestion on US 41, commercial and industrial development may occur in less congested areas such as the Village of Suamico, southern Oconto County, and Village of Hobart.	The US 41 improvements may accelerate new development in planned growth areas beyond the study area, particularly in the Village of Suamico, southern Oconto County, and the Village of Hobart.	Same as Alternative D.
Notes: 1. Summary of Cumulative Effects listed in this table were identified by the local expert panel.			

In summary, the expert local panel did not identify any substantive cumulative effects for Alternatives D or E compared to Alternative A (no build). The proposed US 41 improvements, within the context of other past and reasonably foreseeable actions, are likely to contribute slightly to the pace of population growth and development in the study area. Because land along US 41 is already largely built out, plans for the study area generally call for infill and redevelopment of land surrounding the US 41 corridor. As a result, the impacts of the proposed US 41 improvements will likely be minimal.

3.2.3 Measures to Minimize Potential Adverse Effects

The indirect effects analysis did not indicate the need to revise the proposed improvements or to otherwise mitigate the potential indirect effects. The proposed improvements are not anticipated to conflict or interfere with local planning goals and objectives. Further, as development occurs, local governments have the statutory authority to manage any potential adverse impacts through land use planning and zoning.

Existing and future local land use regulations and other tools as identified by the local expert panel will play a role in helping to avoid, minimize or mitigate the potential for adverse cumulative effects. Commonly used land use and planning tools are listed below. In addition, WisDOT will take measures to ensure that adverse effects to natural resources are minimized and mitigated to the extent practicable through highway design and construction practices.

Comprehensive planning

Wisconsin law requires adoption of comprehensive plans to guide local land use decisions. At the time of the ICE analysis, all study area municipalities had adopted comprehensive plans in place.

Goals and objectives for preserving natural, cultural, and agricultural resources are included in the following comprehensive plans:

Brown County Comprehensive Plan

- Promote preservation of Brown County's irreplaceable resources such as soils, surface and ground water, and wildlife habitat through means such as agricultural best management practices, erosion control, stormwater management and land acquisition.
- Encourage preservation and public acquisition of environmentally significant areas such as shorelands, wetlands, streams, floodplain, upland forests, wildlife habitat and geological features.
- Support efforts to preserve threatened and endangered species.
- Promote preservation of cultural, historic and archaeological sites through interpretive programs and facilities.

Village of Howard Comprehensive Plan

- Preserve wetlands, floodplains, and other environmental areas to link various parts of the village and to serve as wildlife corridors, pedestrian trails, and stormwater management areas.
- Promote a harmonious relationship between the natural landscape and future development through incentives for the use of conservation subdivisions and other techniques.
- Identify and protect significant historic and scenic sites, including archaeological sites and promote their value to the village.
- Maintain existing agricultural areas as long as possible by promoting infill development and orderly expansion of growth areas.

Village of Suamico Comprehensive Plan

- Preserve wetlands, floodplains, and other environmental areas to link various parts of the village and to serve as wildlife corridors, pedestrian trails, and stormwater management areas.
- Promote a harmonious relationship between the natural landscape and future development through incentives for the use of conservation subdivisions and other techniques.
- Identify and protect major drainage corridors through watershed planning in order to aid in the management of stormwater runoff.